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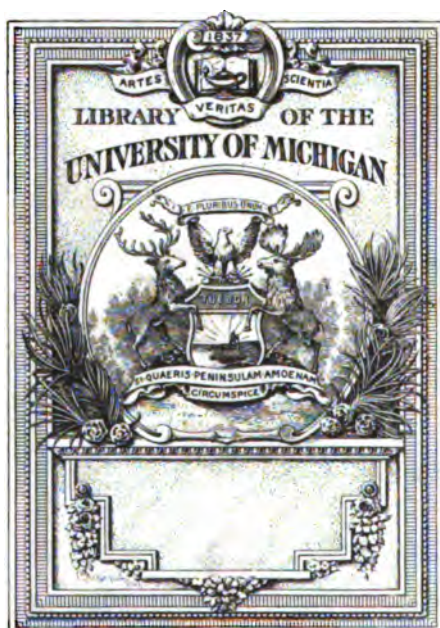
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Forestry

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U.S. Dept of state

FORESTRY IN EUROPE.

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REPORTS

FROM THE

CONSULS OF THE UNITED STATES.



WASHINGTON:
GOVERNMENT PRINTING OFFICE.

1887.



[CIRCULAR.]

Department of State,

Washington, November 30, 1886.

To the Consular Officers of the United States—

Gentlemen: You are instructed to prepare a report covering the following questions on Forest Culture and Forest Preservation. I would ask you to devote especial attention to the practical phases of the question, that your replies may serve as a basis for framing forestry legislation in this country, where the subject is of great and increasing importance:

1. Areas under forests, distinguishing, where possible, between state and private areas.
2. Common forests, if any, and privileges of the population in them. If pasture is permitted, how are the trees, &c., protected?
3. Organization and functions of government forest bureaus.
4. Revenues from government forests, cost of maintaining or managing forests; profits of forest cultivation.
5. Forest planting and culture; methods; bounties, if any; schools, their organization and courses of study.
6. Destruction of forests, causes and results.
7. Reclamation of sand dunes or waste places by tree planting.
8. Sources of lumber supply; trade in lumber; bounties on importation, if any, and customs duties.
9. Give the names of three reliable sellers of seeds and shoots in your district.
10. Transmit to the Department copies and translations of the Forest Laws of the district in which you reside. [The general laws should be forwarded by the Consul-General; the local laws, by the Consul.]

I am, Gentlemen,

Your obedient servant,

JAMES D. PORTER,
Assistant Secretary.

WEIGHTS, MEASURES AND CURRENCY.

Cental	Equals 220 pounds.
Centner meter	" 221.5 pounds.
Florin.....	" 35.9 cents.
Franc	" 19.3 cents.
Hectare	" 2.471 acres.
Joch	" 1.42 acres.
Kilogram.....	" 2.2046 pounds.
Mark	" 23.8 cents.

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CONSULAR REPORTS

ON

EUROPEAN FORESTRY.

AUSTRIA-HUNGARY.

REPORT OF CONSUL-GENERAL JUSSEN.

GOVERNMENT CONTROL.

THE forest laws of Austria prescribe and control, not only the culture of the forests belonging to the imperial domain, but also all woodlands which are the property of municipalities, private corporations or private individuals, and are based upon the theory of paternal government

If the law, as it stands, is enforced not a tree can be cut nor a load of dry leaves gathered in a forest which is situated in Austria except in accordance with certain rules and restrictions, and although there may be much in these laws which may serve for framing future forestry legislation in the United States, the greater portion of the enactment is in direct conflict with the American idea of home government and property rights.

The Austrian Empire is unusually rich in forest lands. There is no lack of dense woods in any of its provinces except, in Dalmatia and in Istria and in the territory near Trieste, and the culture of forest lands may be called exemplary, especially in Bohemia, Moravia, Upper Austria, Silesia, and Salzburg.

The yield of these vast forests, although it is said to be on the decline, still far exceeding the home demand and large quantities of wood are exported.

AREAS UNDER FORESTS, PUBLIC AND PRIVATE.

The latest statistics place the total area of the productive land of the Empire at 28,406,530 hectares [one hectar equal to 1.74 joch, 1 joch = 1.42 acres]; of these total numbers of hectares 9,227,061.20 hectares are forest

lands, and these again are divided into imperial (state), municipal, and private forests, as follows: Imperial forests, 952,689.96 hectares; municipal forests, 1,297,238.21 hectares. The private forests, therefore, cover about 32 per cent. of the total area of the productive land of the Empire.

COMMON FORESTS AND PRIVILEGES OF THE POPULATION IN THEM.

As common forests of the Empire only the woodlands belonging to the several cities and villages can properly be denominated. The residents of these cities and villages undoubtedly enjoy certain privileges as to the use of these forests by virtue of the local laws and regulations. I am not in a position, however, to have access to these local regulations, which undoubtedly differ in the different communities, but are one and all subject to the general law on forest culture and preservation hereinafter cited. This general law, if strictly enforced, furnishes the means of ample protection against any injury that may possibly threaten these common forests by the wasteful or careless exercise of any privilege granted by local enactment.

ORGANIZATION AND FUNCTIONS OF GOVERNMENT FOREST BUREAUS.

The cultivation and preservation of the forests of the Empire of Austria and the administration of the laws with reference thereto are intrusted to the Ministry of Agriculture. The right of appeal, however, in certain contested cases to the Ministry of the Interior is reserved.

Under the supervision of the Minister of Agriculture the several provincial presidents (*statthalters*) are authorized to execute the forest laws and regulations, and as next in authority to these *statthalters* the several district captains are empowered to enforce the laws in question and to exercise a general authority, supervision, and control over all the subordinate officers charged with the execution of the forest laws and forest police regulations. This subordinate class of forestry officers is composed of two classes:

1. The officers who have entered the service permanently, after passing the requisite examination, and are in the line of promotion like officers of the regular army.

2. The volunteer officers who for the sake of pursuing their studies and adding practical experience to theoretical knowledge accept the position in the forest service as an honorable distinction, but receive a salary in proportion to the extent of their field of action and responsibility.

This latter class, however, like the first, must have passed certain examinations, proving their qualifications, before they can enter the service as such volunteers.

The professional and regular forest officers in the Empire are classified as follows:

A. FOREST INSPECTORS.

2. Chief forest counsellors (called *oberforesträthe*).
5. Forest counsellors (or *foresträthe*).
7. Chief forest commissaries (called *oberforestcommissäre*).

B. FOREST TECHNICISTS.

Forest inspection commissaries (called *foresttechniker*).

C. FOREST WARDS BELONGING TO THE CATEGORY OF SERVANTS.

Forest wards, Class I, salary per annum, 500 florins.

Forest wards, Class II, salary per annum, 400 florins.

Forest wards, Class III, salary per annum, 300 florins.

The forest inspectors are charged with the duty of superintending the execution of all forest laws, of examining the condition of the forests, fostering and furthering instructions in forest culture and acting as adjuncts to the *statthalter*.

From early spring until late in the fall the forest inspector should visit and inspect the forests in his district and make a report of each inspecting tour to the *statthalter*.

The *statthalter* may also order the forest inspector to make special inspecting tours in addition to the regular tour.

The forest inspector is required to inspect the offices of the district captains with reference to forest affairs.

The instructions to forest inspectors contain sufficient points, elaborately presented, to fill a moderate sized pamphlet, and the gist of the whole matter is that the forest inspector acts as a paternal adviser, and if need be as an imperative commander to all owners of forests in the Empire, as well as a superintendent of imperial forests.

He controls and commands private owners as to the manner and order in which they should cut their timber, as to the necessity of replanting, the preventing of waste, the preservation of timber against floods, and as to the danger and injury threatening from insects, as to fitness and capacity of the subordinate forest inspectors and hunters and forest wards to be employed by these owners; in short, there is not a single act of ownership which the holder of the titled deeds of woodland could possibly exercise over his own domain which is not directly under the control and which does not require the approval of the forest inspector.

In the light of these instructions it is not at all paradoxical to say that the owner of forest land in Austria must exercise extraordinary care not to be guilty of trespass upon his own lands. There can be no question, however, that this paternal control has achieved most excellent practical results, though it is said that the discipline of forest officials has been lax and that the laws and instructions have not been enforced with uniform strictness. The forest technicians and forest wards are the subordinate officers of the forest instruments by which the duties above enumerated and imposed upon the forest inspectors are practically performed.

FOREST REGISTER (WALDKATASTER),

In pursuance of a decree of the Ministry of Agriculture under date of July 3, 1873, the respective forest officers are required to keep a forest register of each district, which specifies the number of acres covered by forest, its condition, state of growth, &c.

In connection with this register maps are prepared and kept open for inspection at the offices of the district captains upon which the condition and extent of the several forests in the district are shown.

At the close of each year a report about the progress of forest culture, &c., is to be made to the Ministry of Agriculture, which report is to be published in the *Landes Zeitung*.

The total number of forest officers of all grades, public and private, employed in Austria reaches the respectable figure of 31,826.

REVENUES FROM GOVERNMENT FORESTS—COST OF MAINTAINING OR MAN-
AGING FORESTS—PROFITS OF FOREST CULTIVATION.

On the point of the profits of government forests there are absolutely no statistics published in the Empire, as far as I have been able to ascertain, except those given in the budget under the head of forest revenues and expenditures.

The last budget published places:

The forest revenues, p. a.....	florins...	3,951,650
The forest expenditures.....	do...	3,546,240
Profit of state forests.....		405,410

These net proceeds of an area of government forest land, containing 952,689.96 hectares, certainly seems very inconsiderable, but in order to estimate the true value of these forests to the Empire, their influence upon the climate, the rainfalls and the consequent benefit to agricultural land as well as to the health of the population, should be taken into consideration.

A direct benefit also results to the population from the employment of numerous officers attending to the cultivation and preservation of these forests, all of whom are paid and supported by the profits derived from the culture.

It cannot be contended, therefore, that the people are taxed in order to support a small army of forest officers, who are actually producers, earning more than they expend.

The private forests of the Emperor are estimated at 58,545 joch (1 joch = 1.42 acres) and those of the imperial family at 43,296 joch. But I have not succeeded in obtaining any information as to the net proceeds of these forests.

Archduke Albrecht owns 195,605 jochs* of forests, which undoubtedly yield a large revenue, as they are famed for their model cultivation.

Prince Johann Lichtenstein is the owner of immense tracts of forests, in all, 136,103 hectares.*

This prince forms an exception to the general rule observed by the noble owners of large domains who have abstained from acquainting the public with the sum of profits derived from their possessions.

* 1 hectare = 1.74 joch, 1 joch = 1.42 acres.

According to statistics published by the manager of Prince Lichtenstein's forests in 1855 the net profit from 203,744 joch of forest land amounted to 729,789 florins per annum, or 3.58 florins per joch. In 1870 the net proceeds are said to have reached 900,000 florins.

Other princes and nobles own immensely large tracts of woodland, but none have favored the public with an estimate of their profits.

The most considerable possessions of forest lands are the following:

Prince J. A. Schwarzenberg.....	hectares...	110,718
Count Schönborn.....	do...	124,563
Prince of Sachse-Coburg-Gotha.....	do...	74,181
Baron von Sina.....	joch...	105,000
Prince Esterhazy.....	do...	154,000

Conservatives favor these large possessions in the hands of a few noble owners on the ground that the woods of Austria would have been cut down and destroyed if they had been held by numerous small owners who had not the capital to cultivate and preserve them. Possibly this argument has been imported from England.

I find on an examination of the meagre statistics to which I have had access that the profits of forest land culture have materially increased during the last fifty years.

The *Kataster* (Real Estate Register) shows that in Lower and Upper Austria the net profit per joch was estimated at 1.41 florins in the year 1830, while in the year 1880 this estimate rose to 2.62 florins per joch, an increase of almost 100 per cent. and an incontrovertible proof that the forest laws of Austria, which were passed in 1852, have been of great practical benefit to forest culture.

This benefit is proven, not only by the increased net proceeds of a given area of forest lands, but also by the growth and greater extent of the area itself.

FOREST PLANTING AND CULTURE METHODS—BOUNTIES, IF ANY—SCHOOLS, THEIR ORGANIZATION AND COURSE OF STUDY.

The methods of forest planting and culture prevailing in Austria are quite particularly prescribed in the forest laws herewith enclosed. There are no bounties paid in the Empire for planting or replanting of forests.

Schools.

The schools for forest culture were transferred in 1878 from the Ministry of Agriculture to the Ministry for Culture and Education, but all organic order and appointments of professors are made by the Ministers of Culture and Education with the concurrence of the Minister of Agriculture.

While there are undoubtedly numerous provisions of the forest culture law which cannot be applied or enforced in the United States, the system inaugurated in Austria to fit and educate young men for the duty of enforcing this law seems beyond all question worthy of imitation to the fullest extent.

These Austrian schools for forest culture consist of—

- a. University (*hochschule*).
- b. Middle or preparatory schools.
- c. Elementary or lower schools.

The university (*hochschule*) is situated in Vienna; it was founded in October, 1875. Its aim and purpose is the highest possible scientific education in land and forest culture. All expenditures are borne by the state. The semesters (terms) are limited to six—that is, complete instruction is not perfected under six semesters.

The students. •

The students are either ordinary or extraordinary hearers.

The ordinary hearer must produce a testimonial as a graduate of a gymnasium (college) or high school (*oberealschule*). A testimonial which would also admit the students to any university.

Whoever does not possess the qualification of an ordinary hearer may be admitted as an extraordinary hearer if he is eighteen years old and has that degree of preparatory education which will enable him to understand the lectures.

Guests may be admitted to single lecture on notice to the dean (rector). All hearers are subject to the discipline regulations of the university.

Immatriculation, tuition fee, and laboratorium tax.

The immatriculation fee is 5 florins for all hearers. The ordinary hearers pay a tuition fee of 25 florins at the beginning of the semester (term).

Extraordinary hearers pay 1.50 florins per week for each lecture.

Ordinary hearers, if poor, may, as a reward for great diligence, be released from the payment of tuition fees if the college of professors so decide.

The laboratorium tax is 5 florins for fifteen hours.

Certificates of attendance.

The attendance at lectures is certified to at the end of each semester. In case of non-attendance the fact is stated on the certificate. These certificates are to be delivered to the dean for examination.

Examinations and testimonials.

The examinations are public and conducted under the supervision of the dean (rector).

In deciding the degree of success in examinations, not only the written school examination, but also the labor in the laboratory and the authenticated studies in chambers are to be taken into consideration.

Every ordinary hearer has the right to be admitted to the state examination if he so desires.

Regular and full diplomas are only issued to ordinary hearers.

Extraordinary hearers can claim only a testimonial certifying to their attendance at lectures, good conduct and general progress in their studies.

Regulations of discipline.

The college of professors are authorized to enforce the regulations of discipline and all hearers bound to obey them.

Violations of discipline are indecent behaviour, disturbance of peace and order, long absence from the university, damaging the collections, &c.; insubordination towards the dean or the professors or other functionaries of the university, or insulting behaviour toward them or the fellow students. For the purpose of enforcing discipline the following punishments are provided:

- a. Reprimand by professor.
- b. Same by the dean.
- c. Threats of dismissal from university.
- d. Dismissal either for a limited time or permanently.
- e. Dismissal from all universities of the Empire forever, a punishment imposed through the ministry on the request of the college of professors.

Themes of examinations for diploma in forest culture.

FIRST GROUP.

1. Physics with climatology.
2. Chemistry.
3. General and special botany.
4. Mineralogy and geology.
5. Mathematics.
6. Geodesy.
7. Mechanics.
8. Geometry.
9. National economy.

SECOND GROUP.

1. Forest culture.
2. Forest felling with forest technology.
3. Forest preservation with forest zoology.
4. Forest laws.
5. Forest yield, regulation, and management.
6. Forest statistics.
7. Forest engineering.

The examinations are both oral and in writing, during which the use of, and reference to, books and memoranda are not permitted.

Only ordinary hearers who have performed the three years course in the university are admitted to examinations for diplomas.

If the student desires to enter the service of the state as a forest officer he must subject himself to, and pass, two state examinations after he has obtained his university diploma.

The subjects of the first state examination are the following: Physics, climatology, chemistry, botany, geology, higher mathematics, geodesy, and national economy.

The second state examination embraces the subjects of culture, use and yield of forest lands, calculations on values of forests, forest machinery, and forest laws.

These state examinations are conducted orally and in public. The state issues diplomas to the successful candidates.

Middle or preparatory schools for forest culture.

Three of these preparatory schools have been established in the Empire: One at Eulenberg, another at Weisswasser, and the third at Lunberg.

The conditions of admission to the Eulenberg school are the following:

1. The applicant must be a graduate of a lower gymnasium (under gymnasium or *unterreal-schule*, preparatory college).
2. He must have served with good success for two, or at the very least one year, as the apprentice of a forest official.
3. He must not be less than seventeen and not more than twenty-four years old.
4. Must be in perfect health, and vaccinated.
5. Must furnish security as to means required for instruction, clothing, and support.
6. Must pass a preliminary examination by the teachers of the school.

The scholars, whose number shall not exceed twenty to twenty-five per annum, reside at the institute.

The branches taught embrace mathematics, field engineering, drawing, natural history, forest culture, forest laws, business correspondence, office routine business, and hunting.

The conditions of admission to the other two middle schools are of about the same character, and nearly the same branches are taught there, all calculated to fit the student for admission at the university at Vienna.

In all these schools excursions are made by the scholars under the guidance of the teachers for the purpose of combining practical illustration with theoretical knowledge in the branches of natural history, forest culture, preservation, and valuation.

Examinations take place at the end of each semester (term).

Elementary (niedere) schools for forest culture.

The Ministry of Agriculture has established four of these lower schools, one in Tyrol, one in Styria, one in Galicia, and one in Agglsbach.

Course of study: Mathematics, geometrical exercises, field engineering, measuring of wood and timber cut and standing, measuring of earth and excavations, writing, drawing, natural history, geology, mineralogy, zoology, game as distinguished from other animals.

Practical works: Felling timber; numbering, measuring, and piling same; planting and replanting forests; draining and irrigation; protection against insects and fires; charcoal making, sawing lumber and hunting.

The scholars are also required to construe and explain the most important provisions of the forest laws and to commit them to memory.

They are also taught the use, value, &c., of all building material, viz, wood, lime, bricks, stone, sand, &c., and are instructed in the building and clearing of forest roads and securing of the banks of forest streams, and repairing fissures in same, &c.

As teachers in these elementary schools experienced forest officers are detailed.

The discipline in these schools as regards the conduct and studies of the scholars, as well in school as in chambers, is very strict.

No scholar is permitted to absent himself from the institution without leave; the side arms and guns intrusted to the scholars for practice, must be cleaned in the presence of the teachers and delivered to their care; all tools used by them must be cared for in the same manner.

If an offense against the regulations is repeated three times dismissal follows.

Strict moral conduct is enforced and the scholars are continually under the direct control and supervision of one of the teachers, who is also charged with the duty of visiting the scholars in their rooms.

All moneys belonging to the scholars must be deposited with the teachers, who supply the depositors with the amount actually needed from the deposit funds, and the parents are advised of this regulation.

The regulations of discipline are too voluminous to be cited here in full. They also differ somewhat in the different schools, but on the whole they are framed in a strict military spirit, which looks upon obedience to rules of conduct as a first requisite to a successful course of study.

A young man who has graduated from an elementary to a middle forest school, and from that to the university or high school of forest culture, who has obtained his diploma at the latter, and has also passed the two state examinations, may be said to be thoroughly fitted for his profession, and besides undoubtedly clean, healthy, robust, and thoroughly manly in a physical as well as in a moral sense.

DESTRUCTION OF FORESTS, CAUSES AND RESULTS—RECLAMATION OF WASTE PLACES BY TREE PLANTING.

The causes of the destruction of forests have been the same in the old world as in the new.

The greed of men, the desire of speedy gain without reference to consequences, the want of judgment and knowledge as to cause and effect in the courses of nature and its developments, have razed and shorn the forests along the spurs of the Alps and the shores of the Mediterranean with the same merciless energy which has been displayed in this direction along the shores of American rivers and on the slopes of American mountains.

A great area of the shore provinces of this Empire is now almost an arid desert. There is little timber in Dalmatia and Istria and in the territory near Trieste.

The dearth of timber and wooded slopes is so pronounced that the region has been denominated by a particular name, "The Karst," which in its common acceptation is almost synonymous with "Sahara."

There was a time, though not within the memory of men now living, when all this region was covered with a dense oak forest.

Already in the year 452 before Christ these woods furnished the material for Roman castles, houses, and ships.

Venice, while in her pride and glory as queen of the seas, also drew her supply for ship building and pile foundations from this source, and what was left was purchased and chopped down by the merchants of Holland and England.

When the timber was all cut down and nothing left but the roots there was still hope that a new forest would have grown up out of the bare ground during the course of centuries, but then the native inhabitants stepped in and took possession and by pasturing their sheep and goats upon the treeless plains and hillsides made all growth from the roots impossible, and they even dug up the roots for firewood, and thus made a very clean and thorough job of this barbarous devastation.

The result in a climatic direction has, as a matter of course, been highly disastrous. The same region which had been famous for its mild and temperate climate has become changeable and unreliable, landslides and avalanches have come and gone their unobstructed way, the mountain creeks have become dry, and the whole face of the country has been changed from a rich, fruitful, and salubrious climate to an arid, sterile plain, interspersed with stony and parched hillsides, populated by meagre sheep and goats and their equally meagre owners.

The work of reclaiming these wastes is necessarily slow and expensive. The government of Austria has, however, made laudable efforts in this direction. Central stations for the raising of young trees adapted to the climate and soil have been established and millions upon millions of young trees have been furnished gratis to the several communities for replanting. Wherever the government met with indifference on the part of the population with reference to the replanting of forest special laws have been passed and tracts of lands have been condemned for the public purpose aforesaid and the inhabitants have been compelled by law to work in replanting trees for a certain number of days or to contribute an equivalent in money at the outside figure of 50 kreutzers for each day. Most of the communities, however, have of late taken hold of this work with energy and much has been accomplished.

Wherever communities possessed the right of grazing their sheep and goats upon these treeless tracts subsidies have been granted to compensate them for the loss, and sheep and goats have been banished from their grazing ground, this being the first condition to a new growth from the old roots and to the development of the young newly-planted trees.

In replanting these waste places it has been found that the seeding of tree seeds is entirely impracticable and without any hope of success.

The hot winds deprive the earth of the moisture necessary to the sprouting of the seeds, and if the seeds should send up small shoots these tender plants succumb to the drouth.

The most successful replanting in the long run is shown to be the planting of young trees from one to two years old, separately planted in holes one foot square, one foot deep, and three to five feet apart. This mode of replanting is also claimed to be the cheapest. It is estimated that one man

can dig from eighty to one hundred holes per day and that "one woman" can place daily from four hundred to six hundred trees in the holes. In digging the holes care is taken to displace the surrounding soil as little as possible, so that the moisture may be preserved.

The holes are dug in the fall; the planting takes place either in the fall, winter, or spring, as the weather may permit.

All this work is performed under the supervision and direct advice and control of forest officers who are paid by the government.

SOURCES OF LUMBER SUPPLY—TRADE IN LUMBER AND CUSTOMS DUTIES.

The lumber supply of the Empire is principally derived from its forests; comparatively little lumber is imported.

The extent of the trade in lumber and wood is shown by the following table, exhibiting the export and import of the same for the period from January 1, 1886, to November 1, 1886.

I am unable to give the figures for the whole year, as the statistics for the months of November and December, 1886, will not be published until some time in February or March next.

	Export.	Import.
Firewood.....meter centner...	1,603,494	542,663
Tan bark.....do...	9,752	807
Wood for manufacturing purposes, hard.....do...	1,320,715	136,646
Same, soft.....do...	5,726,765	641,731
Barrel staves.....do...	1,224,282	34,343
Railroad ties.....do...	270,248	13,561
Sawed lumber, hard.....do...	671,966	24,396
Same, soft.....do...	5,804,783	106,981

1 meter centner = 221 $\frac{1}{2}$ pounds English.

Customs duties.—No duty whatever is imposed on wood, lumber, or staves, whether of European or Foreign growth or manufacture.

In compliance with instructions I herewith give the names of four reliable sellers of seeds and shoots in my district.

Seeds and plants.—Swoboda Neffe Nachfolger, Porzellangasse No. 14, Vienna; Weyringers H. Nachfolger, Rothenthurmstrasse No. 26, Vienna.

Nurseries.—Abel, Rudolph & Co., Hietzing, Anhofstrasse No. 40, bei Wien; Bachratys, Lukas, Wiltwe, Liesing, bei Wien.

I also transmit herewith two copies of the general forestry laws of Austria and a translation of the same.

I have also mailed this day to your Department a treatise on forest culture, based upon theory and experience, written by Ludwig Jaeger, forest inspector of the Duke of Wittgenstein, which work undoubtedly contains more extended and reliable information on the subject of forest culture than I could possibly gather by mere inquiry from experts and forest officials.

EDMUND JUSSEN,
Consul-General.

UNITED STATES CONSULATE-GENERAL,
Vienna, January 31, 1887.

[*Translation of the General Forest Law of Austria in force since January 1, 1853.*]

CHAPTER I.

CULTIVATION OF FORESTS.

SEC. 1. Forests are distinguished as (a) State or Imperial forests under the control of the State authorities. (b) Common forests, belonging to city and country communities. (c) Private forests, belonging either to private individuals, or to corporations, or to orders, monasteries, benefices or prebends.

SEC. 2. No forest can be withdrawn from cultivation and used for other purposes except by consent. This consent can only be granted with reference to State forests by the proper authority, and if questions of strategy or military defense arise the concurrence of the Ministry of War is required.

With reference to common and private forests the consent of the district authorities is required, and all parties interested are to be heard on the application, and in case of conflict of interests the matter is to be submitted to the proper civil judge.

The arbitrary use of forests for other purposes is punished by a fine of five florins per joch. [1 joch=1.42 acres.]

The area thus converted to improper use must be replanted within a certain time, to be fixed by experts. In case of default the fine is again imposed.

SEC. 3. Newly-cleared tracts of State or common forests must be replanted within five years. A longer time may be allowed for the replanting of private forests, according to circumstances, and in pursuance of the provisions of section 20.

SEC. 4. No forest should be devastated; that is, so treated that the cultivation is either jeopardized or made impossible. If the cultivation has only been jeopardized a fine will be imposed in accordance with section 2, and the replanting is to be enforced. If, however, cultivation has been impossible, a fine up to 10 florins per joch will be imposed.

SEC. 5. A cultivation which exposes neighboring forests to injury from winds is prohibited. A strip of woods at least 20 Vienna klafter wide must be left, when such danger exists, along the margin of the neighboring woods until the same is in full growth. In the meantime this wind-cloak can only be thinned.

SEC. 6. On sandy soil and on steep mountain slopes the timber can only be cut in narrow strips or thinned out, and must be immediately replaced. The woods upon the summits of mountains must only be thinned.

SEC. 7. On the shores of large rivers or lakes, if the shores are not composed of rocks, and on the slopes of mountains, where landslides are possible, great care is to be exercised, and roots can only be dug if the fissure is immediately repaired.

SEC. 8. Violations of sections 5, 6, and 7 are punished with a fine of from 20 to 200 florins. Damage accruing to others to be paid by offender.

SEC. 9. Provides for cultivation of common forests, and for limitation and official control of grazing and other privileges and uses.

SEC. 10. Grazing is not permitted in young timber, where it might injure the growth, and no more cattle are to be driven into any woods than can find sufficient food within the area. Herdsmen must be employed, and the cattle shall graze together, and not isolated, as much as possible. The driving of cattle to the place of grazing to be done with due regard to the preservation of the forest; if necessary a circuitous route is to be taken.

SEC. 11. Bedding of dry leaves and moss must be gathered only with wooden rakes, without scratching up the soil. In young timber no gathering of bedding is permitted.

SEC. 12. From felled trees all the branches may be cut; from standing trees, selected for future cutting, the lower two-thirds of branches may be cut. The young shoots between the strong branches must be preserved. From trees which are not to be felled immediately the branches must be cut between the months of August and March, excepting only during severe frost. No climbing vines are permitted.

SEC. 13. The gathering of bedding can only be permitted on the same ground every third year. Young shoots may, however, be gathered with permission of owner.

SEC. 14. Provides for regulating the exact time within which parties possessing the privilege may gather bedding. Time to be fixed by the owner.

SEC. 15. Provides for the different marks on timber to be felled.

SEC. 16. Where the preservation of young timber requires it the cutting and transporting of timber must take place in the fall or in winter during snow fall. Generally timber may be cut also in spring or summer, but in such case it must be taken out of the woods before the next ensuing spring.

From trees felled in the green leaf the bark is to be peeled at once; from these felled in the late fall the bark must be taken in strips before the next spring. The stumps must not be left too high. In felling trees, hewing and transporting timber all injury to standing trees is to be avoided. The same rule obtains with reference to the gathering and transportation of bedding, which must be removed out of the woods within three months.

SEC. 17. All products of the woods must be removed on the road designated by the owner. The time of removal as agreed between owner and purchaser of timber to be requested; if not so requested owner may give fourteen days' notice and dispose of products if notice is not complied with.

SEC. 18. Provides that forest officials (political authorities) shall decide all differences and disputes. Owners of forests who violate regulations to be fined for each offense from 20 to 200 florins.

SEC. 19. Provides that the state, in case of necessity, can take possession of forests for the purpose of protection against avalanches, landslides, &c. If claims for damages arise they are to be settled according to law.

SEC. 20. Provides manner of proceeding for the purpose of taking such possession, examination of experts, &c.

SEC. 21. As a rule no partition of common forests can be made.

SEC. 22. For the purpose of insuring the proper cultivation of forests all owners of forests of sufficient dimensions [which dimensions are prescribed by the authorities] are required to employ only such forest officers as are considered qualified by the government.

SEC. 23. The political authorities are charged with the general superintendence of all forests in their respective districts.

CHAPTER II.

TRANSPORTATION OF FOREST PRODUCTS.

Every land owner is required to permit forest products to be transported across his land if no other outlet is convenient, or if other transportation is too expensive.

The transportation must be conducted with proper care, and all damages accruing must be paid.

The political authorities decide whether such transportation across lands of third parties is necessary and also fix amount of damages, from which decision as to damages an appeal may be taken to the courts.

SEC. 25. Provides for jurisdiction with reference to transportation over public roads, &c.

SEC. 26. The transportation of wood by means of rafts and the building of booms require special permission by the authorities of the district. If the use of private waters is required proceedings must be had according to Section 24.

SECS. 27 to 43. Refer to the regulation of rafting, marking of timber transported by rafts, use of rivers and other waters, public and private, for rafting, &c.

CHAPTER III.

FOREST FIRES AND DAMAGES BY INSECTS.

SEC. 44. The greatest care must be exercised in igniting fires or in using combustible materials in or near the forests. If damages arise in consequence of neglect to use such care the offender must pay all damages, and may, according to circumstances, be either prosecuted under the general criminal code or fined from 5 to 40 florins, or imprisoned from one to eight days.

SEC. 45. Every person who finds a deserted and unextinguished fire in or on the edge of a forest is required to extinguish it, if possible. If any person observes a forest fire he is held to give notice to the next inhabitants in the direction of the road which he travels. These parties so notified are required to give notice to the nearest local authorities and to the owner of the forest or to his forest officials.

SEC. 46. All surrounding villages can be required by the owner of the forest, or his forest officials, or by the local authorities, to extinguish the fire. The posse must at once repair to the place of the fire with the necessary fire-extinguishing apparatus. The local authorities and the forest officials must accompany the posse.

SEC. 47. Unconditional obedience is to be paid to the superior officer commanding the posse. The other local officials must preserve order among the firemen and cause the execution of the orders. After the fire has been extinguished the place where it occurred is to be guarded from one to two days, or longer, if necessary, and the necessary number of men must be furnished for this purpose.

SEC. 48. Local officers who neglect to perform their duty will be fined from 5 to 50 florins, and all persons who refuse to obey their orders will be punished by a fine of from 5 to 15 florins, or by imprisonment from one to three days.

SEC. 49. Damages to property of third parties, caused by extinguishing these fires, are to be paid by the parties for whose benefit the posse was called, unless this third party was protected against still greater loss by the efforts of the posse.

SEC. 50. The damages caused to forests by insects are to be closely watched. The owners of forests and their employes are required, in case they cannot succeed in preventing the spread of such damage to adjacent woods, or on their own grounds, to notify the political authorities at once, or in default thereof to pay a fine of from 5 to 50 florins. Every person is authorized to give such notice.

SEC. 51. The political authorities, with the assistance of experts, must at once take the proper measures to prevent this damage by insects. All owners of forests whose woods may be in danger are bound to render assistance and to submit to the order of the authorities, who are herewith authorized to enforce their orders. The expense shall be borne by the owners of the forests in proportion to the dimensions of their respective tracts.

IV. CHAPTER.

FOREST PRESERVATION SERVICE.

SEC. 52. Provides for the organization of forest guards to be attached to the forest administration service. These guards, whether employed by the state, by communities, or by private individuals to take the oath of office. [Form of oath general, with reference to performance of duties in preserving forests as law requires.]

SEC. 53. These sworn guards to be regarded as public guards, with all rights guaranteed to public officers by law, and authorized to carry the usual arms. Every person is required to obey their orders given in the line of their duties.

SEC. 54. The guards shall use their arms only in case of self-defense. To wear uniforms.

SEC. 55. The guards are authorized to order suspicious persons to leave the forests and to confiscate all tools used for gathering forest products if the parties carrying them in the forest cannot give a satisfactory explanation.

SEC. 56. Confiscation of forest products in possession of suspicious party in the forest.

SEC. 57. Offenders who are strangers to the guard are to be arrested; offenders known to the guard are to be arrested only in case they attack or abuse him, or if they have no fixed home. Persons arrested to be delivered at once to the competent authorities.

SEC. 58. In case the offender was caught in the act and took flight he may be pursued beyond the forest and the stolen product attached.

CHAPTER V.

Contains an enumeration of minor forest offenses not hereinbefore particularly mentioned, and fixes the punishment.

These offenses are: Gathering of loose wood and twigs, marking and barking of trees, using climbing irons, boring into trees, appropriating bark from felled timber, exposing the roots of trees, cutting or tearing off limbs or twigs or leaves, digging or cutting out young trees, gathering twigs for brooms, gathering tree juice of all sorts, gathering tree seeds or sponges or rotten wood or digging out roots, gathering bedding of all sorts, especially if gathered with hoes or iron rakes; taking away earth, clay, turf, stones, and other minerals, or cutting sod, or mowing grass and herbs.

This chapter also provides for proceedings and estimate for damages to forests by cattle.

CHAPTER VI.

Provides for mode of procedure and proper tribunal to fix damages.

CHAPTER VII.

Provides for proceedings on appeal.

FRANCE.

*REPORT OF CONSUL MASON, OF MARSEILLES.**

THE general destruction of forests which has entailed such serious consequences in Southeastern France may be attributed to two general causes. The first of these is the privilege "of pasturage and passage" that has been vouchsafed for many centuries to the flocks and herds of the peasantry, which are permitted to range freely upon all unclosed lands belonging to the communes and the state. The summers of Provence are long and dry, and the effect of continuous grazing has been to denude thin, poor soil of the hills and mountain slopes of grass and herbage to such an extent that the roots were either killed by the drouth and heat or were thrown out of the loosened earth by subsequent freezing and thawing. As a consequence the soil of many thousand acres of high pasture land has been washed away by the violent vernal and autumnal rains, leaving even the roots of trees so exposed that they, in turn, were swept down by sudden floods and the violent winds that prevail in this country. Large areas of forest were thus destroyed.

The second cause has been the improvident and short-sighted interference of man with the course of nature. One effect of the French Revolution was to divide the land throughout a large part of France among a greatly increased number of small peasant proprietors. They were poor, and compelled by circumstances to utilize every resource. If the few acres of a peasant were covered with forest he cut the trees away for the double reason that the timber was valuable and he needed the land for pasture. It was only after the trees were gone that he learned that the destruction of the forest entailed the ruin of the pasturage that grew beneath its protecting boughs. The consequences have been disastrous throughout nearly the whole mountain region of Southeastern France. Hundred of thousands of acres of upland have become arid and barren wastes of plutonic earth, seamed by rugged chasms and gullies, which in the rainy season pour down torrents of mud and stones upon the fertile lands below and fill the streams with sudden floods that devastate the valleys from mountain to sea.

To resist this serious and constantly growing retribution, the French Government nearly seventy years ago began a system of forest supervision, fol-

* As both the forestry schools in France are located in departments remote from this district, I have stated simply the character and scope of each school, leaving its course of study to be explained in detail by the Consuls in whose districts the schools are respectively located.

Similarly, the National Code of Laws which regulates forest culture and preservation throughout France is left, in accordance with your instructions, to be transmitted by the Consul-General.

The statistics of forest area in the several departments, as given on the following page, are official and trustworthy, but are not as recent as could be wished, being based upon the returns of 1878. I have applied to the Central Forestry Bureau at Paris, for similar statistics corrected to date, and if these can be obtained, a revised table of areas will be forwarded to the Department to replace the one now submitted, and which will embody the latest figures that are accessible in this district.

lowed later by the replanting of trees and grass in situations where the denudation of mountain slopes had become dangerous to the adjacent valleys. For these reasons the forest culture in this region has been hitherto mainly for protective purposes rather than to reclothe the country with timber for industrial uses.

The trees chosen have been of the species which are strongly rooted, capable of holding their own against flood, frost, and wind rather than those which are simply valuable for firewood or lumber. Wherever it was possible due preference has been given to the chestnut, the cork oak, the carob tree, and others which yield some form of useful fruit, but the first requisite in all high situations has been to replant the pines, larches, and firs, whose dense evergreen foliage and *debris* of fallen leaves and needles would form a covering which, with the mosses that grow in damp shadows, would retain the water of snow and rains and preserve the moisture of the earth beneath. Forest culture on an effective scale in this country would be far beyond the unaided resources of most individual land owners, and the entire system, as it now exists, is the work of the general government, which educates and trains the foresters, purchases and appropriates lands where tree planting (*reboisement*) is deemed necessary, plants and cultivates new forests, and furnishes tree plants and seeds *gratis* to private land owners who need them for practical forest culture. The system employs a large corps of officers and men, and constitutes a special bureau of the national government.

The consular district of Marseilles embraces nine departments and the Island of Corsica.

The following table will show the total area of each department, its proportion of waste lands, pastures, and forests in 1878, as well as the quantity of its woodlands which were held respectively by the state, by communes, and by individual proprietors:

Departments.	Total area.	Pastures.	Waste land.	Private property.	Wood land.		Control public institutions.	Total.
					State property.	Communal property.		
	<i>acres.</i>	<i>acres.</i>	<i>acres.</i>	<i>acres.</i>	<i>acres.</i>	<i>acres.</i>	<i>acres.</i>	<i>acres.</i>
Bouches du Rhône...	1,261,484	150,010	427,010	124,920	.....	53,646	347	178,913
Var	1,489,492	49,606	142,446	489,940	23,698	125,383	205	639,226
Basses Alpes	1,716,004	37,561	721,573	171,243	1,426	143,667	97	316,433
Hautes Alpes	1,381,270	297,827	272,853	59,900	4,665	204,670	29	269,264
Gard	1,442,048	93,446	303,824	200,874	3,496	113,744	.....	318,114
Hérault	1,531,608	35,584	74,143	180,480	.....	31,954	2	212,436
Aude	1,560,090	64,457	305,633	106,538	25,220	31,149	213	163,120
Vaucluse	881,600	18,731	201,872	118,304	7,818	70,638	17	196,777
Pyrénées	1,018,530	23,480	455,801	80,245	44,278	55,178	420	180,121
Corsica	2,161,530	48,394	860,720	166,772	110,924	234,257	4,934	516,904
Total	14,443,736	829,097	3,765,886	1,599,216	221,525	1,064,286	6,281	2,991,308

From these statistics it will be seen that not less than 3,765,886 acres, or more than one-fourth of the entire area of this district is waste land, useless except for the scanty and wretched pasturage which grows upon part of it,

and totally unfit for cultivation. A large part of these waste lands is the tops of hills and mountains, most of which were once covered with trees, and which, having been denuded of their natural vegetation, have become a constant menace to the plains and valleys below. The destruction of their forests has greatly reduced the rainfall throughout the district, and from their hard, barren slopes water pours down during the wet season as from the roof of a house, burying with mud or sweeping away everything in its path. There is but one remedy for these misfortunes—to reclothe the hills and mountains near the sources of rivers with the forests which nature provided, and to this task the French Government has addressed itself with characteristic and persistent energy.

There are in France two schools of forestry, one for the education of officers of the corps, the other for training the guards and subordinates who work under their direction.

The officers' school was established in 1827 at Nancy, nearly 200 miles east of Paris. Its faculty includes seven professors and five tutors, and the course of study occupies two years. Candidates for admission must present diplomas as Bachelors of Sciences, so that the two years at Nancy are designed to add a special course of study to an already liberal education. Graduates who aspire to appointment in the French forestry service must be citizens of France, but pupils of English nationality, for instance, have been admitted and trained for service in India. Upon graduating the student receives appointment as "Garde-General Stagiaire," who draws a salary of about \$400 per annum when assigned to active service.

Subsequent promotion in the corps follows the subjoined grades:

	Salary per annum.
Garde-General.....	\$400 to \$500
Deputy Inspector.....	600 to 750
Inspector.....	1,000 to 1,200
Conservateur	2,000 to 2,100
Inspector-General	3,000

The duties of the higher officers include all those elaborate works of engineering and construction by which dangerous mountain slopes are sustained and strengthened against rain and frost until the soil can be recreated and fixed by restored vegetation. Of Inspectors-General, the highest grade in the corps, there are eight now in service. A *conservateur* usually has charge of the forestry of a department, though in regions where the area of forest is small one officer of this grade may have charge of this department, while in districts where the work is difficult and important, as in the Basses-Alps, there may be two *conservateurs* in a single department.

The school for subordinates in the forestry corps is at Barres, in the department of Loiret. The course of studies there occupies likewise two years, but is much more practical and elementary than at Nancy, candidates for admission being required to pass examination in only the elements of primary education. Upon graduating they are appointed "brigadiers," or sergeants, in the forestry corps. The "gardes forestiers," or privates in the corps, are

recruited largely from ex-soldiers who have shown especial intelligence and fidelity during their years of military service. For good conduct and efficiency as "gardes" they may, after long service in the forestry corps, be promoted to "brigadiers" without having taken the course of study at Bares. For the actual labor of preparing and planting the ground laborers are employed in the neighborhood of the work to be performed, and the money thus distributed by the state has gone far to compensate the peasants for the restrictions which exclude their flocks from the newly-planted forests and pastures.

In 1879 it was estimated that 250,000 acres of practically waste land had been thus reclaimed during the preceding nineteen years at a cost to the state of \$500,000 per annum during that period. The law of April, 1882, which enables the government to appropriate all lands near the sources of rivers, "réboisement" is deemed necessary, has greatly facilitated the work, and the area thus reclaimed in the single department of Basses Alpes since 1864 is not less than 50,000 acres.

The trees and shrubs principally employed are as follows: For the high lands the fir, larch, beech, and black Austrian pine. For lower situations and valleys, the live oak, sylvan pine, Corsican pine, maritime pine, carob tree, cork tree, chestnut, and pine of Aleppo. These are planted according to the nature of soil, exposure, &c., either from the seed or as young plants grown in nurseries conveniently established for that purpose. Experience has shown that certain of these varieties, by reason of their long, central roots and absence of lateral rootlets, are difficult to transplant with safety, even at the age of one or two years, and they are therefore propagated by planting the seeds upon grounds to be rewooded, which if poor or especially exposed, are previously prepared by digging and sowing with grass or small plants which will hold the soil in place and give the young trees a temporary shelter. Those of the above species which are found in practice to grow best from direct seed planting are the maritime pine, the live oak, cork tree, the gall-bearing oak ("*Chêne rouvre*"), the chestnut, and Corsican pine. The carob tree, beech, elm, and fir, as well as the sylvan pine and black Austrian pine, require to be planted as young trees or sprouts, propagated from seeds in nurseries and transplanted at the age of one or two years.

The poplar and willow can be easily grown in favorable situations from cuttings planted in holes pierced in the soil with a sharp iron instrument having a transverse wooden handle like an augur.

In soils which are very dry and much exposed to sun and violent winds oaks and pines are grown together in order that the latter may give to the more delicate and slow-growing oaks a certain protection during their first years of immaturity. Beeches and firs are planted only after such preliminary shelter has been successfully established.

The method of planting, as well as the implements employed, vary entirely with the altitude, nature, and condition of the soil, some seeds being sown broadcast, while others are planted with the hoe, like corn, at intervals

of three or four feet; or, in hard, unprepared ground, the seeds or young plants are placed in holes made with a "*proche*" or mattock. The live oak, chestnut, cork tree, gall oak, carob tree, lavender, beech, ash, and sycamores are planted in autumn, all others from the middle of March to the end of April.

Seeds of all the trees above mentioned are gathered abundantly in France except the Austrian pine, the seeds of which are imported from the Styrian Alps, and the carob, which, although it bears abundantly the podded seeds which are used for the food of horses and cattle, is generally propagated from seeds brought from Algeria and Spain.

In nearly all the departments where tree planting is practiced to any important extent the government has nurseries where seeds are collected and such varieties as grow best from sprouts are propagated in readiness for planting. At these nurseries, in fact throughout the forestry service, great kindness and liberality is exercised toward all land owners who wish to undertake forest culture on their own lands. Not only are they supplied *gratis* with seeds and young trees, but the officers and men of the corps are instructed to give them all possible encouragement and advice as to the best methods to be pursued. It is, of course, only the more intelligent and far-sighted of the peasants and proprietors who avail themselves of these opportunities to begin improvements, the good results of which will be inherited mainly by future generations; but the success of the system is now demonstrated, and it is becoming year by year more popular among the people. At first there was a strong resentment among the peasants against the withdrawal of so large a part of the unenclosed lands of their communes from the range of their flocks—for no sheep or goat or other domestic animal is allowed upon ground where trees have been replanted. This hostile feeling was neutralized in some degree, as already stated, by the liberal wages paid by the state for tree culture, and the disastrous floods of recent years have taught the lesson that the reclothing of the hills and mountain slopes with forests is far more important than the pasturage which is thus temporarily withheld.

From all this it will be apparent that forest culture in the Mediterranean region of France is inspired by a different motive and involves greater difficulties than would be encountered in all but the far western Territories of the United States. Wherever there is arable land in France it is more valuable for cultivation than for forest growing, and throughout this district the area of replanted forest in each department is in almost exact proportion to the altitude of its surface and its worthlessness for the purposes of agriculture.

The right of pasturage, as already intimated, is freely granted upon all waste and unoccupied lands, the only formality required being that of obtaining a license from the departmental authorities. This pasturage is generally, however, exceedingly thin and poor. Grass grows but sparingly on all unirrigated land in Southern France, and the most valuable parts of many high pasture lands are the aromatic shrubs and plants upon which sheep and goats browse for want of better nourishment.

The cutting of timber on private property is free and unrestricted to proprietors in valleys and on low lands. In high woodlands that cover slopes which, if denuded, might be cut and washed by heavy rains, the government, through its forestry corps, carefully regulates the cutting of timber. No tree can be lawfully felled on such property without special permission. No bounties are now paid for tree planting. In former years the bounty system was practiced, but it failed to stimulate forest culture to the desired degree and was replaced by the present system, under which the government supplies tree plants and seeds to land owners at only the cost of packing and transportation, and encourages them by the advice and suggestions of forestry officers to retimber their lands. For the same reason there are in this district no private dealers in the seeds and shoots used in forest culture. The French Government is, however, extremely generous and obliging to representatives of other countries who wish to profit by its facilities and experience in this respect.

In a treatise published in 1882 by Mr. Demontzey, then conservateur of forests in the Bouches du Rhone, the following are given as the cost prices of gathering and cleaning in readiness for planting the seeds of trees which are mostly used in the forest culture of this district:

	Cost per cental of 220 pounds.
Live oak.....	\$2 70
Cork oak	3 00
Gall-bearing oak (<i>chêne rouvre</i>).....	2 30
Carob tree	2 31
Chestnut	2 89
Beech.....	3 47
Elm.....	4 82
White ash.....	7 72
Linden.....	9 63

Seeds of the various species of pine which, to become marketable are required to be picked from the cones, are much more expensive and bear the following prices:

	Per kilogram of 2½ pounds.
Aleppo pine.....	\$0 43
Maritime pine.....	25
"Pin pinier"	25
Sylvan pine.....	1 20
Corsican pine.....	1 27
Black (<i>laricio</i>) Austrian pine.....	75
Hook-leaved pine (<i>P. uncinata</i>)	1 12
Pitch pine (<i>abies excelsa</i>).....	31
<i>Pinus cembra</i>	16
Fir (<i>abies pecturata</i>).....	17
Larch (<i>larix Europea</i>).....	50
Cedar.....	56

There are no sand dunes of any extent in this district, and they are not, therefore the object of any special effort at reclamation by means of tree planting.

THE LUMBER SUPPLY OF MARSEILLES.

No bounty is paid for the production of lumber and no duty is imposed upon imports of that class. The timber and lumber imports of the past four years at this port were:

Years.	Oak railway ties.	Oak lumber.	Other lumber.
	<i>Kilograms.</i>	<i>Kilograms.</i>	<i>Kilograms.</i>
1882.....	38,216,000	2,384,000	54,738,000
1883.....	41,962,000	2,059,000	43,555,000
1884.....	46,170,000	1,878,000	42,838,000
1885.....	32,450,000	1,358,000	30,167,000

The imports of 1885 are divided as follows in respect to origin:

From.	Oak railway ties.	Oak lumber.	Other lumber.
	<i>Kilograms.</i>	<i>Kilograms.</i>	<i>Kilograms.</i>
Italy.....	29,290,000	120,000	616,000
Austria.....	3,160,000	656,000	2,362,000
Russia.....		57,000	
Russia (Black Sea).....		761,000	
Russia (Baltic Sea).....			8,459,000
Turkey.....		11,000	501,000
Sweden.....	11,134,000		
United States.....			5,040,000
Roumania.....			671,000

Most of the American lumber imported here comes from Pensacola, Savannah, Galveston, and other ports of the Southern States, and there is a prospect that this trade may in future show a steady increase.

There are no local forestry laws in the district, the whole subject being regulated by the very elaborate and comprehensive national code, which is represented and enforced by the forestry corps.

FRANK H. MASON,

Consul.

UNITED STATES CONSULATE,

MARSEILLES, *December 30, 1886.*

SOUTHWEST FRANCE.

REPORT OF CONSUL ROOSEVELT, OF BORDEAUX.

The forests in the departments of Dordogne, Gironde and Landes, which form the XXIXth circumscription of forest reservation, are divided as follows:

	State.	Communes.	Private.
	<i>Hectares.</i>	<i>Hectares.</i>	<i>Hectares.</i>
Dordogne.....			188,454
Gironde.....	25,544.50	1,390.54	560,166
Landes.....	26,838.38	7,952.66	400,192
	52,382.97	9,543.20	1,148,912

The inhabitants of the communes have the right accorded gratuitously, or at an almost nominal figure, to the accessory products of the commune forests, such as green or dried grasses, dead stumps, pasture, &c. The cuttings or trimmings are either sold or given away. If sold the proceeds are covered into the municipal treasury to be used in defraying the expenses of the commune. If given away, they are divided among the families of the district. Pasturage is only permitted where the trees are old enough not to suffer from the teeth of the cattle. Young forests are protected by barriers of light portable wooden fences, wide ditches and banks of earth, known in the vernacular as *baradeaux*.

ORGANIZATION AND FUNCTIONS OF GOVERNMENT FORESTS BUREAUX.

Government forests are divided into thirty-five reservations or districts. The XXIXth district, as above mentioned, comprises the departments of the Dordogne, Gironde and Landes, with supervisions at the following cities: Bordeaux and Lesparre in the Gironde; Mont-de-Marsan and Dax in the Landes. The supervisions in each department are subdivided into inspections of cantonments, as follows: Inspection of Bordeaux, cantonment of Bordeaux, cantonment of Ares; inspection of Lesparre, cantonment of Lesparre, cantonment of Montchic; inspection of Mont-de-Marsan, cantonment of Mont-de-Marsan, cantonment of Parentis; inspection of Dax, cantonment of Dax, cantonment of Saurtons.

In the department of Dordogne there are no forests entirely controlled by the Government, which has the right only of supervising the clearing of private forest lands.

The supervisions are managed by inspectors, and the cantonments by deputy inspectors or forest keepers.

The inspectors superintend all business affairs, and regulate office and outside works.

The chiefs of cantonnements are generally employés of the Government service. They must be thoroughly conversant with matters appertaining to forest culture, so as to instruct and direct the workmen and forest keepers in all outdoor labor. The forest commissioners centralize the business, correspond directly with the head administration, and have connection with the chiefs of the departments of their respective districts.

REVENUE FROM GOVERNMENT FORESTS.

The revenue from the forests of the XXIXth district is uncertain, as the forests are young and as yet not regularly parceled out. Receipts are greatly inferior to disbursements owing to the expensive work of keeping the sand dunes of the coast in proper condition. The receipts of 1885 were only 22,000 francs, while the disbursements amounted to 296,000 francs. The annual revenue from the Government forests of France and Algiers varies from 30,000,000 to 32,000,000 francs. The expenses for 1886 were estimated at 16,350,000 francs.

PLANTING AND CULTIVATION.

The forests of the XXIXth district are divided into three categories:

1. Oaks along the river.
2. Maritime pines along the coast.
3. Underwood near Bordeaux and Dax.

Trial is now being made to perpetuate the forests by the natural sowing of the seed by the trees. The underwood is reproduced by shoots from the stumps and roots. When a young group of these trees are obtained, and are sufficiently advanced, their growth is aided by cultivation, which consists in clearing and thinning, assuring the predominance of the best species. Artificial replanting, such as sowing the seed, or planting young trees, is resorted to as rarely as possible.

In the southwest the usual manner of renewing the forests is by sowing the acorn or the seed of the maritime pine. The acorns are planted in holes made by a dibble or mattock. The pine seed are sown in rows or furrows. Private parties use methods analagous to those employed by the Government. The only bounty or premiums offered by the Government as encouragement to arboriculture are the gratuitous donations of seed and plants. These, however, are distributed only in the mountainous regions.

FORESTRY SCHOOLS.

There are two special schools of arboriculture in France, one at Nancy (superior), and one at Barres (primary and secondary). The rules regulating admission to either school are practically the same. The National School at Nancy is especially devoted to the education of young men destined to become employés of the Government forest service. The scholarships are divided into two categories—government and free. With the exception of

scholars coming from the polytechnic and agricultural schools, all aspirants must submit to competitive examination. Aspirants for the free list, if of French origin, obtain permission to enter the examination by applying direct to the director of the school. Foreigners must apply through the diplomatic representative of their respective countries. The course of study is two years. At the expiration of this term scholars who creditably pass the final examination are inscribed upon the rolls of the administration of forests, with the rank of general guard licentiate, and receive a salary from the Government. Aspirants less than eighteen and more than twenty-two years of age are not admitted to the examinations. Parents on entering their sons as government pupils must deposit 1,050 francs with the accounting officer of the school, to be used in purchasing uniform, necessary bed linen, topographical instruments and other objects necessary for the course. An additional annual sum of 1,500 francs, payable the 1st of November and 1st of April of each year, for board, laundry expenses, daily care of room, servant hire, indispensable books and supplies, excursions for practical study, and riding lessons. A separate amount of not less than three hundred nor more than six hundred francs is required for pocket money and incidental expenses. Besides the above-mentioned sums parents or guardians of the scholars are compelled to pay one per cent. of the gross amount to the accounting officer as compensation for care and management of pupils' money. On arriving at the school the scholars are examined by a physician connected either with the civil or government hospital, who reports upon their physical condition, attesting that no deformity or malformation exists rendering the applicant unfit for study or for forest service. Defective eyesight is considered a physical incapability. The examinations on both oral and written with an average of 20 per cent. for the oral and 15 per cent. for the written, as follows:

Written.

Mathematics	15
Dissertation or French narrative	15
Dictation in French	15
Trigonometry and logarithmic calculations.....	10
German theme	5
Copy drawing	6
Lineal and India ink drawings.....	10
	—
	76

Oral.

Sciences. { Arithmetic and algebra.....	20
{ Geometry	20
Physics	20
Inorganic and organic chemistry.....	20
Mechanics and cosmography	20
German	10
History and geography.....	15
	—

The following is the programme of studies for the two scholastic years:

FOREST ECONOMY.

First Year.—Classify ligneous products, cutting and sale of wood, cubature of cut wood, qualities and defects of wood, elements of forest production, study of the different methods of treatment; planning and laying out gardens; methods of clearing; simple cutting; cutting of underwood and timber trees, artificial restocking, fixing the dunes, mountain forests and regulating torrents.

Practical Studies—Excursions to the forests of the Eastern Department of France and the environs of Nancy.

Second Year.—Decisions and fundamental principles relative to the parcelling out of forests.

Parcelling out timber trees and underwood.

Parcelling out the conversion of forests; estimation and sale of wood on foot.

Estimation of forests in depth and surface.

Practical Studies—Cutting trees for shipbuilding; cutting and studies of parcelling out in forests in full leaf and in resinous forests.

POLITICAL ECONOMY AND FOREST STATISTICS.

First Year.—Production, circulation, division, consumption of the wealth, economic character of the wood and application of general political economy in the production of wood; forest statistics of France and foreign countries.

NATURAL HISTORY.

Botany.—Organs of nutrition and vegetable reproduction; technical physiology of vegetables.

Practical Studies—Harvest of plants and forming forest herbarium.

GEOLOGY AND ZOOLOGY.

Second Year.—Mineralogy, lithology, geology; descriptive history of France vertebra, forest entomology. Zoological classification.

Practical Studies—Geological excursions in the eastern departments.

First Year.—Organization and privileges of public authority. Property and its production. Repression of injury to forest property. Legislation regarding hunting.

Practical Exercises—Written composition relative to studies taught.

Second Year.—Judicial reference between real estate (servitude, treatment, pretension), and persons (usufruct and mortgage), between persons (sale, rent, concessions, work, enterprise); management of forests subordinate to the different forest lands.

Practical Exercises—Written composition relative to studies taught.

APPLIED MATHEMATICS.

First Year.—Planimetry (instruments, surveying, and raising plane surfaces). Altimetry (instruments, levelling), construction of roads.

Second Year.—Trigonometric and triangulation operations. Applied mechanics, roads, forest building, sawmills, constructions for regulating torrents.

Practical Studies—Triangulation of a forest; design for building a bridge; a joist building, sawmill, barrier in masonry.

AGRICULTURE.

Second Year.—Vegetable production, animal production, tillage, application of vegetable physiology, and agricultural chemistry to "silviculture."

GERMAN.

First and second years.—Vocabulary, grammar, composition, translation of German works on forest culture.

MILITARY INSTRUCTION.

First Year.—Lessons in shooting, soldier school, company school.

Second Year.—Artillery study and fortifications.

Practical Exercises.—Manceuvres, shooting field service, reconnoitering, fortifications.

DESTRUCTION OF FORESTS—CAUSES AND RESULTS.

The destruction of forests, frequently resulting from the abuse of man, such as indiscriminate cutting, immoderate pasturage of horned cattle, sheep, and especially goats, and frequently from fires due to negligence and carelessness. The causes of destruction beyond the control of man are cyclones, lightning, erosions made by the sea, rivers, &c.

Forests devastated by any of the above-mentioned causes are renewed either by the help of nature or by artificial means.

RECLAMATION OF SAND DUNES.

From the mouth of the Gironde river to that of the Adour there are immense hills, of different dimensions and altitudes, formed during ages by deposits of sand from the sea at high tide, and which the west wind carried inland for a great distance, forming a tract of six hundred miles in width without a shrub or plant growing upon the inhospitable and barren waste. The invasion of the sand threatening villages and agriculture of the coast had become a terror, and every effort was made to arrest its invading march. The first effort of importance was made during the last century by Abbe Desbiez, of the Academy of Bordeaux, who conceived the idea of fixing the dunes by cultivation. No reliable date is extant bearing upon the result of his labor. In 1786 Mr. Brémontier, a civil engineer, began a successful experiment of reclaiming the dunes by first building palisades parallel to the sea and then by sowing the dunes with seed of the maritime pine mixed with seed of the furze and brush broom. Previous experiments had demonstrated that the pine seed planted alone would not grow. Mr. Brémontier was the first to permanently fix the sand dunes of France, and as a result of his labor and example the dunes to-day are covered with valuable forests, which, from their production of resin, lumber, pasturage, &c., are a source of wealth. The pine forest of La Tête-de-Buch is the oldest in this department. It was given to the inhabitants of that section of the Guienne in 1543 by Frédéric de Foix.

The department of the Gironde was formerly covered by forests which, with the exception of small tracts and the sand dunes, are now remembered only in the names of several communes, such as Sauve-Majeure, Pléne-Selve-Bonscat and La Barthe, all signifying places once covered by trees. The principal species of trees in this district are the pine, black oak, white or tanzine oak, elm, yoke elm, willow acacia or locust, Lombardy poplar, Caro-

lina poplar, ash, and maple. The pine is very highly prized, not only on account of the service it renders in preventing the encroachment of sand and in preserving the dunes, but on account, as I have mentioned, of the revenue it brings, both to the government and private parties.

SOURCE OF LUMBER SUPPLY.

With the exception of the exportation of railroad ties to Spain and Africa and supports for mines to England, the production of the forests of the XXIXth conservation are consumed in the district. The local consumption is increased by importations of pitch-pine from the United States, white pine from Canada and Norway, oak and fir from Russia, Germany, Norway, Denmark and Sweden. There are no bounties on importation.

CUSTOMS DUTIES.

Elm, oak and walnut wood, rough, squared or sawed into any dimensions for masts, spars, poles for boat-hooks, oars and building purposes, when imported direct, enter free.

When imported from other than the country of origin, 72 cents per 200 pounds.

Wood split into small pieces direct, 2 cents per 200 pounds.

Indirect importation, 72 cents per 200 pounds.

Wood for cabinet-wood (boxwood) in logs or sawed into pieces not less than eight inches in thickness, free.

When imported direct less than eight inches in thickness, 20 cents per 200 pounds.

Indirect importation, 72 cents per 200 pounds.

Pine poles direct, 5 cents per 200 pounds.

Planks, boards, wood for inlaid floors, planed, tongued or grooved (hard wood), 30 to 40 cents per 200 pounds.

Indirect importation, \$1.12 per 200 pounds.

Rough pine direct, 10 to 20 cents per 200 pounds.

Rough pine, indirect, 92 cents per 200 pounds.

During the year ending December 31, 1886, the following quantity of lumber was imported into the port of Bordeaux:

Countries from whence imported.	Quantity.	Countries from whence imported.	Quantity.
	<i>Tons.</i>		<i>Tons.</i>
Austria.....	154	Russia.....	22,776
Canada	12,488	Sweden	29,943
Germany.....	12,041	United States.....	5,819
Norway.....	4,517	Total	87,738

The following are the names of reliable sellers of seeds and shoots in the XXIXth district: Cordier et fils, Bernay (Eure); André Leroy, Angers (Main et Loire); Levasseur et fils, Ussy (Calvados); Veuve James et fils, Ussy (Calvados); Armond Colombe et fils, Ussy (Calvados).

In this district there are no local laws appertaining to forests.

GEORGE W. ROOSEVELT,

U. S. Consul.

UNITED STATES CONSULATE,

BORDEAUX, *February 17, 1887.*

COGNAC.

REPORT OF VICE-CONSUL COATES.

The total area of the XXIVth commission of the woods and forests is 314,363 hectares, 35,148 of which alone are under the control of the French State; that is to say, belonging to the commons or public establishments, and are subjected to the administration of the woods and forests.

Out of these 35,148 hectares under control 34,131 belong to the State, 691 hectares to the commons, and 326 to public establishments. The surplus of the forests, say 279,215 hectares, is composed of private forests not under the direct control of the administration of forests.

There are no free forests belonging to the State, and pasture in them is only granted to cattle belonging to the guards and brigadiers of the forests. In the forests of the commons the grazing of horned cattle, but not of sheep and goats, is authorized in the forests of lofty trees and in the cope more than ten years. Private forests are subject to no rule but that desired by the owners.

FORESTRY ORGANIZATION.

The XXIVth commission of the woods and forests is under the rule of the keeper, who is in direct correspondence with the central administration at Paris, and who resides at Niort with an adjunct inspector as chief of the offices. It comprises the departments Deux Sevres, Vendée, Vienne and Charente. The commissioner is under the immediate direction of inspectors (four in the present case) residing at Niort, Poitiers, Royan and Sables d'Olonne. They are called heads of the service.

The inspectors are under the direction of adjunct inspectors, or general keepers of the cantonments. In every inspection there are generally an inspector, a sub-inspector residing in the same place as the inspector acting in his stead in case of illness or absence, and a general keeper. The inspectors, adjuncts and general keepers have under them brigadiers (who are like the under officers in the army), who receive their orders from the forest keepers, the last class of the hierarchy.

The commissioners, inspectors, inspectors adjunct and general keepers are called by the collective name of forest agents, and are officers in the army, or similar to them. Brigadiers and keepers bear the collective name of forest overseers.

In the XXIVth commission are one commissioner, two inspectors, two inspectors adjunct, acting as inspectors; two inspectors adjunct, head of the cantonment; an inspector adjunct, head of the offices of the commission; two general keepers, twenty brigadiers, five of whom belong to the offices of the commission, and one of the four inspectors; and eighty-four keepers, seventy-four of whom are demesniai and ten commons. The demesniai keepers are paid by the State and overlook the forests of the State. The keepers of the commons are paid by the commons. The commissioners'

residence is at Niort, the two inspectors at Niort and Poitiers, the two inspectors adjunct, heads of the service, at Royan and Sables d'Olonne; the two inspectors adjuncts, heads of the cantonment, at Niort and Poitiers; the two general keepers at Fontenay-le-Comte and Angoulême.

FOREST REVENUES.

The forests of the State (of which alone we have any precise information) bring in the XXIVth commission about 3 per cent. an hectare, those which are in a productive condition. The forests of the downs (Royan and Sables d'Olonne), about 8,500 hectares, produce as yet nothing of any consequence. Private forests do not produce more than 20 or 25 francs per hectare. The soil is very poor; the wood is cut down too young (14 years old), while those of the State are not cut down before they are 20 years' growth, and the cows and sheep graze in them too much.

Forests are trained into lofty copses, copses under lofty trees and in lofty trees. Private forests are trained into simple copses or in copses under lofty trees. Forests, under forest laws, are in copses under lofty trees, and lofty trees alone. Government has suppressed all privileges concerning forests; they can be mentioned merely as a memorandum. I have not yet been able to obtain any information as to privileges and rights of usage in the other forests, if there are any, with the exception of pasture. Let us observe that as for commons' forests, it is restricted to the inhabitants of the commons or section of owners of commons. There are no forest schools in the XXIVth commission.

The only causes of destruction of the forests that can be foreseen in the XXIVth commission are culture, the encroachments of the sea, that of sand (dunes). No serious damage has as yet been caused by insects. The frequent culture for the first seventy years of this century has stopped the erosions of the sea, and the evasion of the sand has been happily prevented for the last twenty years by the planting of pines and the fortifying of the downs. Fires are only to be apprehended in the forests of pines where measures have been taken to prevent it by opening large cuttings, called "gardefeu."

The rooting up of forests has perhaps been the cause of the change in the equilibrium of the climate. Forests under this point of view have perhaps been the regulator of the climate.

We are unable to furnish any information as to the planting of the downs, sands and heaths in connection with the whole commission. The downs in the XXIVth commission all belong to Government; about two-thirds, say 5,500 hectares, are planted afresh. In the Charente we have heard of no application for replanting, although article 226 of the forest code exempts of all tax for thirty years plantations of that kind, and the Government frequently advances money for that purpose to private parties.

The sources of supplies of timber are: 1. The woods of the region for a small part in consequence of the very high rate of labor and foreign con-

sumption. 2. The foreign countries, Sweden, Norway and Russia for pines, Austria for oaks, America, and chiefly Canada, for all kinds of wood.

All that timber comes by sea, and via Bordeaux.

We have no precise information as to timber in the XXIVth commission, nor as to remittances for importation and custom duty.

In the XXIVth commission we have no seedsmen or dealers in plants. The administration provides for its nursery grounds and in other commissions.

WM. COATES,
Vice-Consul.

UNITED STATES CONSULATE,
COGNAC, *February, 1887.*

PREPARED BY CONSUL DUFAIS.

The area of forests on January 1, 1876, was—

State property.....	967,118 hectares or 10.70 per cent.
Private property.....	6,127,398 hectares or 66.55 per cent.
Departmental and communal.....	2,058,729 hectares or 22.40 per cent.
Public institutions.....	32,059 hectares or .35 per cent.

Total number of hectares 9,185,304—

spread over 35,989 communes.

These forests are classed according to situation as follows:

	Subject to State control.		Not subject.	Total.
	<i>Domainial.</i>	<i>Communal.</i>		
On plains and below 200 meters.....	391,337	94,527	2,835,684	3,321,548
On hills from 200 to 500 meters.....	312,361	884,326	1,609,867	2,806,554
On mountains above 500 meters.....	263,422	881,481	1,912,305	3,057,208
	967,120	1,860,334	6,357,856	9,185,310

PRINCIPAL TREES.

First size.—Beeches, chestnut, peduncular and English oak, fir, pitchpine, larch, forest pine, laricio pine, maritime pine, cembro pine.

Second size.—Tansin oak, cork oak, western oak, white elm, mountain pine, aleppo pine.

Third size.—The evergreen oak is the principal one.

Minor species are more numerous, such as small leafed and large leafed limes, sycamore, maple, ash, meadow and mountain elm, hairy oak, white willow, white, gray, and black poplar, field maple, wild cherry, domestic lorbtree, oxyphelleous ash, birch tree (2 kinds), alder tree (2 kinds), aspen, etc.

Every soil, be it siliceous, argillaceous, or calcareous, from the most barren to the most marshy, from the level plains of the dunes and the sand of the coast to a height of 2,400 meters in the Alps or Pyrenees, where forest

vegetation ceases, has its appropriate wooding. In the northern regions of France or in the elevated regions of the center the pine predominates; in the southwest and warm, damp climate the maritime pine, and in the raw climate of the high alpine regions the cembro pine; in the southeast and Provence the aleppo pine.

As to the revenue of forests in 1876, the 9,185,310 hectares produced a sum of 236,755,429 francs, or an average of 25.78 per hectare, besides such minor revenues as leases of shootings, fishing, pasturage, broom, ferns, etc. The following details are given:

2 departments produce over			70 francs per hectare on 139,688 hectares.		
2	"	"	from 60 to 70	"	" 171,489 "
5	"	"	" 50 to 60	"	" 575,168 "
12	"	"	" 40 to 50	"	" 861,629 "
20	"	"	" 30 to 40	"	" 1,962,654 "
12	"	"	" 20 to 30	"	" 1,283,182 "
13	"	"	" 10 to 20	"	" 1,640,802 "
12	"	"	" 5 to 10	"	" 1,385,938 "
9	"	"	below 5	"	" 1,164,760 "
87 departments.			9,185,310 hectares.		

CUTTING OF WOOD IN FORESTS UNDER STATE SUPERVISION.

In 1876 from 967,120 hectares of State forests were obtained 2,940,426 cubic meters of wood (equals 3.040 per hectare); also 162,592 centals tanbark, 728 centals corkwood, and 9,367 centals rosin gallipot, etc., of a money value of 38,021,170 francs, including shooting, etc., or 40.35 francs per hectare.

The communal forests, or 1,860,334 hectares yielded 5,016,265 cubic meters of wood (equals 2.696 per hectare), 352,974 centals tanbark, 2,234 centals corkwood, 10,625 centals rosin, etc., of a money value of 43,930,759 francs, including shooting, etc., or 23.61 francs per hectare.

The total amount of wood cut was thus 7,956,691 cubic meters, or 6,025,403 meters firewood and 1,932,355 for building purposes.

Wood is sold mostly standing, the government officer marking the trees with his hammer; it is also sold in lump, cut and prepared.

In 1876 the State sold 2,266,254 cubic meters of standing trees, producing 31,274,432 francs; the second modus is resorted to when the trees are yet too young to stand the marking by the hammer. In this way 477,190 cubic meters were sold for 4,087,819 francs. Of cut and prepared wood the State sold in 1876 138,685 cubic meters for 1,656,426 francs, giving an average of 13.80 francs for standing wood, 8.56 francs for sale in lump, and 11.94 francs for cut and prepared wood. Communes generally sell their wood standing.

Neither communes, sections, nor public institutions are permitted to sell any wood, whether subject to government régime or not, without having first obtained government authorization; neither are they permitted to clear them.

The law of 1859 has given private owners the right of clearing, not, however, without government supervision. It is stated that in the ten years from 1866 to 1876 212,984 hectares have been replanted and 112,274 hectares have been cleared. The State only admits cattle in forests for pasturage in cases of extreme drouth and dearth.

Communes granted permission in 1876 for pasturage for 1,344,512 head of cattle at a revenue of 3,380,077 francs, at an average of 5.58 francs per head for cattle, 1.22 francs per head for sheep, and 4.84 francs per head for swine.

The curriculum for three years in the forest school at Nancy is—

First year.—Sylviculture, natural history, applied mathematics, course of law, German language, shooting, etc.

Second year.—Management of forests, mineralogy, geology, sawing, topography, artillery, fortification, etc.

Third year.—Forest statistics, zoölogy, game laws, agriculture, special course of solidifying (fixation) sand dunes, replanting and turfing mountains, etc.

SOURCES OF LUMBER SUPPLY.

There are no bounties on importation.

The principal import in this consular district comes from Sweden and Norway, viz.: white and red pine, mostly deals, battens, boards, and hewn timber; from Russia, oak, in boards and planks, white pine, and hewn oak timber; from New Brunswick, Canada, Nova Scotia, very little, and this principally in spruce deals and battens; from the United States, pitch pine; from Austro-Hungary, through her Adriatic ports, large quantities of oak come to Dunkerque, Dieppe, and Fécamp, which mostly find their way to Paris; Germany, Italy, and Switzerland export to France over her land frontier.

There is no import duty on unprepared timber, boards, etc., except on planed or grooved boards, deals, etc., distinct from simply sawed, which is 50 centimes per 100 kilograms.

From countries which have no commercial treaties with France the import duty is double.

The custom-house tables give the timber imports in kilograms, and therefore afford little information. Into Havre they were in

	1883.	1884.
	<i>Kilograms.</i>	<i>Kilograms.</i>
Oak unprepared or blocks.....	600,000	988,000
Oak sawed.....	2,147,000	2,447,000
Oak staves.....	4,768,242	11,142,190
Walnut unprepared or blocks.....	549,000	1,549,000
Other wood.....	13,346,000	14,192,000
Sawed of all dimensions.....	74,633,000	72,662,000
	96,043,242	102,980,190

Into Honfleur, Pont Audemer, and Trouville in 1886.

From	Tons.	From	Tons.
Sweden	49,277	Prussia.....	900
Norway.....	3,029	America	1,719
Russia.....	32,669	Total tons (of 1,000 kilograms)	87,594

Seed dealers.—For seeds, André Leroy & Co., Angers; for shoots, Leopold Lecouvreur, Pierre Sébire, Le Vasseur & Fils, Ussy (Calvados).

GOVERNMENT FIGURES ON JANUARY 1, 1879.

In the library of the city of Havre I found a volume, or atlas, prepared by the Minister of Finance, and published in 1883, giving the statistics of forests, with a view of their taxation as they existed on January 1, 1879.

Area of forests as per survey, 8,144,718 hectares, and as per new valuation, 8,397,131 hectares,

Net taxable value, 188,910,406 francs.

Net taxable revenue, 22.50 francs per hectare (against 20.18 francs per hectare in 1850).

Taxes collected in 1879, 9,945,219 francs, or 1.18 francs per hectare, ranging from 9 centimes per hectare in Corsica to 5.74 francs per hectare in Department de la Seine.

Proportion of ground tax to net revenue tax averages 5.26 per cent.

Net revenue, corresponding to 1 franc of taxes, average valuation 19 francs.

Money value, 6,256,930,960 francs; highest, 225,000,000 francs, in Landes; lowest, 2,000,000 francs, in Seine.

Average value per hectare, 745.13 francs; highest, 5,706 francs, in Seine; lowest, 144 francs, in Hautes Alpes.

Salable value corresponds to 1 franc of taxes, average, 629.14 francs.

It may be interesting in this connection to have the grand total of surveyed land in France and its value on January 1, 1879.

	Survey.	New estimate.	Salable value.
	Hectares.	Hectares.	Francs.
Land of superior value.....	668,515	695,929	3,829,039,098
Arable land.....	25,452,452	26,173,657	57,514,810,648
Meadows and pasture.....	4,804,440	4,998,280	14,799,518,127
Vineyards	2,109,250	2,320,533	6,887,902,398
Forests	8,144,718	8,397,131	6,256,930,960
Waste land.....	8,108,306	6,746,800	1,394,582,180
Various.....	747,478	702,829	901,232,664
	50,035,159	50,035,159	91,584,016,075

F. F. DUFAIS,
Consul.

UNITED STATES CONSULATE,
HAVRE, March 3, 1887.

CONSULATE OF THE UNITED STATES OF AMERICA,

HAVRE, FRANCE, *February 22, 1887.**Director of the Forestry School, Nancy.*

SIR: I take a great liberty in addressing to you the present letter. The desire to procure for my Government the information which is asked from me must plead my excuse. I am sure none but yourself can assist and guide me better in it. In order to make myself well understood I beg to enclose to you a list of the questions propounded by the United States Government regarding forest culture in France.

The Minister of Agriculture in Paris had the kindness to send me the following volumes:

1. Administration of Forests; Forest Statistics, Paris National Printing Establishment, 1878, with preface by A. Mathieu, sub-director of forestry school, Nancy, May 3, 1878.
2. Forest Statistics by Cantonments, 1879; same author, Nancy, May 15, 1879.
3. The Code of Forest Legislation, by A. Puton, Paris; J. Rothschild publisher, 1883.

I have also found in the library of the city of Havre a statistical atlas of the Minister of Finance, new valuation of the land revenue of France, land not built upon, Paris, 1884, in pursuance of the law of August 9, 1879, made up to January 1, 1879.

The area of forests in France is given in this atlas as 8,144,718 hectares, and new valuation 8,397,131 hectares, whilst, according to the volume stated above, it is given on January 1, 1876, as follows:

967,118	hectares	domainial.
6,127,398	"	private.
2,058,729	"	departmental and communal.
32,959	"	public establishments or institutions.

How is this difference to be explained?

I would also be much obliged to you for giving me information on the following points, which I cannot find in the books in my possession:

2. If pasturage is permitted, how are the trees protected?
4. Profits of forest culture?
5. Mode of planting trees?
6. Destruction of forests; their cause and result?
7. The solidifying (fixation) of sand dunes, and the planting of waste lands; also, whether there are any special laws regulating communal forests outside of State legislation?

It goes without saying that I shall be happy to pay for the preparation of a short report if you will be good enough to state the probable amount.

Please accept, Mr. Director, the assurance, &c., &c.

F. F. DUFAIS,
U. S. Consul.

NANCY, FRANCE, *February 24, 1887.*

MR. CONSUL:

I could only answer your letter of the 22d February by a work which would demand much time.

As you possess the forest statistics of 1878, and the code of the forest legislation, which I published in 1883, it will be easy for you to answer the questions propounded by your Government.

Not much importance is to be attached to the difference between the statistics of 1878 and the valuation of the fiscal revenue of 1884; everything, in fact, depends upon the sense which is given to the word forest. There are lands planted with brushwood, which some include in forests and others not.

I have much more confidence in the work of 1878, because I prepared it at that time myself, with the assistance of Mr. Mathieu.

You may find very complete information, and in abridged form, in a notice which was published by Major Bailey, who was last year at the forest school at Nancy, reprinted from transactions of the Scottish Arboricultural Society, vol. xi, part ii, 1886.

You may procure the volume containing this work at Edinburgh from the society.

Mr. Bailey was instructed by his government to procure this information on the forestry question in France. I have prepared this notice with him, which was published in 1886.

This work being written in English it may be readily consulted by your Government.

I would be at your disposal, if necessary, to prepare a work on the ten questions asked, but it would take some time, which at present is not at my disposal.

Please receive the expression of my, &c.

(Signed)

A. PUTON,

Inspector-General of Forests ;

Director of the National Forest School at Nancy.

REPORT OF CONSUL SHACKELFORD.

The importation of lumber for building purposes is mainly from Norway, Sweden, Russia and Finland. A few cargoes of spruce from New Brunswick and Nova Scotia, and of pitch pine (yellow) from the United States.

It is imported in beams, joists, planks and boards, principally of the following dimensions in English measure, feet and inches, but cut in lengths in metric feet—4 x 9 inches, 3 x 9, 3 x 8, 1¼ x 8, 1 x 8, 1¼ x 5, 1¼ x 4½, 1 x 5, and 1 x 4½.

Formerly white pine from Quebec was used for decks of vessels, but since naval construction is at a stand-still no more is imported.

A few oak logs and railway ties are annually brought from Germany. The duty on all lumber is one franc per 100 kilograms when imported direct from the country where it is grown.

Imports of lumber for the years 1876 to 1885, inclusive—

	Kilograms.		Kilograms.
1876	53,143,572	1881	55,615,949
1877	52,222,236	1882	62,691,842
1878	45,572,086	1883	71,823,448
1879	47,100,326	1884	60,073,175
1880	61,874,888	1885	58,891,614

PLANTS AND SEEDS.

The principal shippers of plants from the extensive nurseries of this city are Les enfants de André Leroy, Louis Leroy, Detriché frères, Paré Delavigne.

The first two named alone ship to the United States. The amount of exports for 1885 was \$13,976, and in 1886 \$13,427.

The plants are generally seedlings of one year's growth—pear seedlings, Anger quince, mahaleb cherry, common cherry, myrobolan, evergreens, standard roses, &c.

RENNES.

The cultivation of field and garden seeds is an important industry at the city of Rennes, but varies in amount, according to the season and the crops. The principal shipping firm writes me: "The crops we have grown this season for England will amount to £12,000, and our home trade varies from £10,000 to £15,000 per annum. The shipments to the United States for the year 1886 amounted to \$24,235. The principal firms are Messers. Honédry fils & Morice, M. Horchet, M. Lanseyeur, the first-named being the only one who ships to America.

H. A. SHACKELFORD,

Consul.

UNITED STATES CONSULATE,

NANTES, *March 17, 1887.*

GERMANY.

REPORT OF CONSUL-GENERAL RAINE.

I SUBMIT herewith my report relative to forest culture and preservation in Germany, particularly in Prussia, as instructed by your circular, dated November 30, 1886.

Permit me also to call your attention to the report of Consular Clerk Zimmerman, November 6, 1880, upon the subject of forest culture, and to my annual report, No. 57, dated November 7, 1885, containing also statistics on forestry.

The appointment of an efficient person, familiar with forestal matters, to visit this country and study its forest management, might be of advantage.

AREAS UNDER FORESTS.

The area devoted to forests in Germany is computed at 13,908,398 hectares, equal to 25.7 per cent. of the entire area of the Empire. [1 hectare = 10,000 square meters, or 2.471 acres.]

It may be of interest to state in what proportion the remainder of Germany's soil is utilized, viz.:

	Hectares.	Per cent.
Agriculture, horticulture, vineyards, &c.....	26,311,968	48.7
Meadows.....	5,903,344	10.9
Pastures and sterile lands.....	5,041,226	9.4
Courts, yards, roads, water.....	2,860,149	5.3
Forests, woods.....	13,908,398	25.7

Richest in forests are:

	Per cent.
Schwarzburg-Rudolstadt.....	44
Saxe-Meiningen.....	41.9
Province of Hesse-Nassau	40
Baden	37
Bavaria	33
Hesse-Darmstadt.....	31.3
Wurtemberg	30.8
Brunswick	30
Saxony (kingdom).....	27.04
Prussia (kingdom).....	23.04

Owners of German Forests.

	Hectares.	Per cent.
States of Crown.....	4,546,757	32.7
Communities	2,109,913	15.2
Charitable and other institutions (donated forests).....	185,987	1.3
Corporations of forest owners (<i>Waldgenossenschaften</i>).....	344,757	2.05
Private parties	6,720,924	48.03

In confining my report more chiefly to forestal matters in Prussia, permit me to say that the management of forests in Prussia can be regarded as typical for the other German states.

The Prussian government exercises not only full control over forests owned by the state, but extends the same, as far as laws permit, also to forests not belonging to the state. And this is of great importance since the latter occupy an area twice as large as the former.

Without such supervision on the part of the Government a reckless devastation of forests would be the consequence.

As an additional measure for the culture and preservation of woods the act approved July 6, 1875, must be regarded. The same provides for the formation of corporations of such forest owners as possess tracts of forests not large enough to admit of a rational and economical culture of forests. They are called in German *waldschutz-genossenschaften* (forest protective corporations). The formation of the same has been of great benefit since the passage of said act, and contributes much to increase the yield of wood and other forestal produce. While on one hand the Government affords voluntarily and in cases where, under the laws existing, no coercive measures are applicable, every practicable assistance to communities and private parties in promoting forest culture, be it by instruction or good example given by its forestal officers; the same, on the other hand, strives continually to expand the possessions of the state in forests, either by purchase, agreements, &c.

THE GEOGRAPHICAL LOCATION OF FORESTS IN PRUSSIA

shows a great divergence in latitude and longitude, lying between 49° 7' and 55° 54' North and 23° 32' to 40° 33' East.

The forests of Prussia extend from the coasts of the Baltic to the altitudes of the Sudetes, Hartz Mountains, Thuringian Forest, Taunus Rhoen and

Nether Rhenish "Schiefer-Gebirge," while in the Provinces of East and West Prussia, Posen, Pomerania and Brandenburg, forests stand on grounds alternately level or hilly. Their site in Silesia and Saxony has, in nearly equal parts, either a plain or hilly or mountainous appearance. In Westphalia and in the Rhine province the mountainous character predominates. The same is the case in the provinces of Hesse-Nassau and in the smaller part of the Province of Hanover, while in the northern part of the latter they grow on level ground:

The *limit of the growth* of trees is from 1,060 to 1,070 meters above the level of the sea in the Hartz, and up to 1,190 meters in Silesia. Beyond these limits begins the region of the so-called *knicholz* (undergrowth).

According to an approximate estimate it may be presumed that about 4,043,800 hectares of forest occupy level ground; 2,089,500 hectares of forest occupy hilly ground; and 1,991,200 hectares of forest occupy mountains.

According to situation forest culture is affected by a variety of conditions of climate and soil, necessitating a variation of system of cultivating woods and permitting the growth of nearly every species of German trees, which, in Prussian forests, are principally cultivated, viz :

1. Firs (*abies excelsa*; *abies pectinata*).
2. Pines (*pinus sylvestris*, *strobus*, *austriaca* and *montana*).
3. Oaks (*quercus pedunculata* and *sessiliflora*).
4. Beech (*fagus silvatica*).
5. Birches (*carpinus betulus*; *betula verrucosa*).
6. Alders (*alnus incana*; *alnus glutinosa*).
7. Larch (*larix Europæa*).

PRIVILEGES OF THE PEOPLE.

Poor people living in the vicinity of forests are permitted, provided rights of other beneficiaries are not interfered with, to gather and carry off dead branches of wood, either without charge or by paying a small sum of money.

Provincial authorities are also empowered to sell to the poorer classes limited quantities of inferior wood during the winter at greatly reduced prices, say 25 per cent. less than such wood could be bought for in the market.

The right of grazing cattle, in exceptional cases also sheep, is permitted to the people in the neighborhood. A small charge is made, but such permission is subject to the judgment of the forestal authorities, who have to decide whether the grant of such right is not prejudicial to the growth of the trees.

Hogs are sometimes allowed to enter forests as a means of destroying insects.

Tracts within the limits of forests which can be used as meadows are rented, but much care is taken to prevent misuse.

Leaf gathering for litter is only permitted to smaller people in extreme cases of need, and to other people only exceptionally, in dry seasons and

when food for cattle is scarce. In the latter case the permission to gather leaves is given to the highest bidder at auction sale.

The gathering of berries, herbs and mushrooms is allowed, but a written permit must be previously procured.

Administration of state forests, or of forests owned by the crown, is entrusted to the Minister of Agriculture, Domains (public estates) and Forests.

Subordinate to this head department are—

First. The central direction.

Second. The local direction, inspection and control. These functions are vested in the provincial governments, with offices in the chief places (two or three) in each province.

Third. The administration, properly so called, under chief foresters, assisted by forest treasurers, who keep account of revenues and expenditures.

Fourth. The department of forest protection, with special superintendents of forestal works and constructions. Their officials are called forest protective officers.

The whole organization is based upon a division of the state forests into so-called *oberfoerstereien* (districts placed in charge of a chief forester). Such chief forester is solely responsible for the state property under his supervision. Chief masters' districts number at present 683, and are under the control of thirty-three chief master foresters (*oberforstmeister*), who have their offices at the seats of the above-mentioned provincial governments. The average salary of a chief master forester is about 5,100 marks annually, besides compensation for rental.

THE PROFESSIONAL SPHERE OF A CHIEF FORESTER

Embraces careful control, to keep intact the limits of forests owned by the state; coöperation and advice in forestal organizations; preparation of annual plans for the hewing or stocking of forests; the laying out of roads, and to superintend all work required for these purposes; also, to see to the utilization of all forestal products; to have the control of all labor (making tar, charcoal, pitch, &c.); to attend to the book-keeping, settlement of accounts, and other administrative work.

A chief forester must be thoroughly familiar with any forest entrusted to his management—its limits, division, economical and legal condition. Daily visits and inspection are required. A chief forester receives an average salary of 2,850 marks per annum and fuel for his use. He derives his appointment from the Minister of Agriculture, Forests, &c.

Applicants for such position are subjected to a rigid examination by experts in forestal matters. An appointee is considered a state officer, permanently in office, and entitled to a pension.

The extent of the different chief forestal districts differs, ranging from 1,000 to 11,105 hectares.

Subordinate to the chief foresters are foresters and forest guards (*waldwärter*), and assistant foresters.

THE DUTY OF A FORESTER

Consists in protecting his district against unlawful use, thefts, and injuries; in watching that hunting and police laws are properly observed; in carrying out the directions of the chief forester regarding the cutting or stocking of the woods, and, upon written permit presented to him, to deliver forest products to purchasers. All breaches of the hunting or forest laws, whether they happen in his own or any other district, must be reported at once to the chief forester. It is also his duty to instruct and superintend laborers employed in the forest, and to attend to the measurement and numbering of all wood cut in the forest. He must keep separate books, containing a memorandum of all wood cut in the forest ("Number Book"); a laborers' account ("Labor Book"); a memorandum of the yield from hunting ("Shooting Book"); and also a book stating any breach or offense against the hunting and police laws. The preparation of a list of wages is likewise entrusted to him.

Smaller and isolated tracts of forests are placed under the supervision of special guards (*Waldwaerter*).

The number of foresters employed in Prussia reaches at present 3,390; average salary, 1,100 marks; 349 guards; average salary, 360 to 660 marks per annum.

All forestal officers have, in addition to their salaries, free fuel and free quarters, or compensation for rental.

The average extent of a so-called "Schutz Bezirk" (district to be protected), of which there are about 3,708 in number, as area designated for wood-growing, is 640 hectares, varying from 171 up to 1,064 hectares.

The foresters are selected from the number of applicants entitled to a state position after several years' service in the military corps of chasseurs (riflemen).

For a better understanding of Prussia's forest organization, it may be stated that every Prussian province is divided into two or three so-called "governments" (*regierungen*), with its seat at some chief place. In connection with such "governments" there is a so-called *oberforstmeister* (chief-master forester), 33 in number, with an average salary of from 4,200 to 6,000 marks, as the head of forest affairs for that "government." Under him, again, are some master-foresters (*forstmeister*), 89 in number, with a salary of from 3,600 to 6,000 marks, having supervisory power over some of the chief forester's districts (*oberforstereien*).

The functions of both the chief-master forester and master forester are, on the whole, only of a supervisory character. The chief-master forester, being also a member of the said district government, is appointed by the Sovereign, with the consent of the Minister of Agriculture, Domains and Forests. He is chosen from among the best qualified forest masters.

PROMOTION OF BEST QUALIFIED OFFICERS IN PRUSSIA.

Generally speaking, it is characteristic of German and Prussian institutions that the higher officials—who must at least have passed laudably all

classes of a gymnasium—in any of the branches of polity, etc., are always selected from among the best fitted men of the same class for higher positions. Thus they have an opportunity to generalize all the experience acquired in subordinate positions, and in same branches of government or political economy, etc. Thus Prussia, particularly, has been noted for nearly a century for its large stock of able and qualified officials.

The Ministry for Agriculture, Domains and Forests contains in its departments for forests the central direction for the whole state administration.

This direction consists of one *oberland-forstmeister* (chief land master forester), 15,000 marks salary; of a director and four technical forest councilors of ministry (7,500 to 9,900 marks salary).

The Minister himself watches over the performance of the general principles for the preservation and utilization of the state property consisting in forests. Upon his proposition the appointments and dismissals of all higher forest officers, from chief foresters upwards, are made. He appoints boards of commissioners to examine the condition of forest administration in the provinces.

The Berlin Ministry has a special forest organization bureau, which has to direct the surveying of the forests, to file the original forest maps, and to take care of their multiplication. This bureau consists of a master forester (6,000 marks salary), examined in forestal sciences and surveying; of a number of technically trained forest clerks and several draughtsmen. In addition to salaries all Prussian officials, hence also foresters, get, if not free quarters in kind are furnished, a compensation in money at rates varying according to the comparative standard of rentals at the places of their residence.

It is made compulsory for all forestal officials to wear uniforms.

REVENUES FROM PRUSSIAN STATE FORESTS.

The last Prussian budget for fiscal year ending March 31, 1887, sets forth the following items of revenues, viz.:

1. From wood disposed of.....	M. 52,000,000
2. Secondary products.....	4,120,000
3. From game.....	341,000
4. From peat.....	280,000
5. From floated timber.....	15,000
6. From meadows.....	84,600
7. From stores of firewood.....	1,750
8. From saw mills.....	481,000
9. From larger nurseries.....	17,000
10. From zoölogical garden near Cleve.....	17,488
10 ^a . From contributions to the foresters' widows and orphans funds, prescribed by law.....	227,000
11. From other revenues.....	439,000
12. From the forest academy at Eberswalde.....	19,210
13. From the forest academy at Münden.....	12,650
Total revenues.....	M. 58,056,000

COST OF MAINTAINING AND MANAGING FORESTS IN PRUSSIA.

Ordinary expenditures.

Salaries	M. 6,577,855
Additional compensation for rental.....	105,560
Extraordinary remunerations and for relief funds for officials.....	2,248,300
Mileage, office expenses, compensation for non-receipt of free quarters.....	1,883,166
Maintenance and construction of new forest-service buildings.....	2,324,000
Maintenance and construction of new roads in forests.....	1,498,200
Macadamized and other roads, bridges	100,000
Drainage, irrigation	60,000
For forest cultures, for nursing plants for sale, for melioration of forest land, etc..	4,290,080
Cost of hunting administration	77,000
Working expenses for peat cutting.....	100,000
laying meadows	23,500
floating timber	12,000
stores of firewood	1,000
sawing mills	389,000
nurseries	21,000
two zoological gardens	12,190
fishing purposes	6,000
Cost for surveying, lawsuits, etc.....	102,000
sales of wood and leasing, messengers' hire, etc.....	15,600
for renewal of officers, mileage	220,000
for extirpation of noxious animals, drainage, irrigation, building ex- penses, etc.....	350,071
Forest schools and other scientific purposes	188,470
Municipal taxes and expenditures for police administration, etc.....	700,000
Amortisation of encumbrances, liens, compensation for imposts and taxes rendered in kind.....	730,000
Widows' and orphans' fund.....	70,400
Contribution to sick laborers' insurance fund.....	7,200
Relief fund, pensions.....	180,000
For relief of paupers living on forestal estates.....	75,000
Relief funds for other persons than officers employed in forests.....	18,500
Purchase of forestal land.....	1,050,000
Total.....	M. 31,787,000

Extraordinary expenses.

Amortisation of old encumbrances, liens.....	M. 1,500,000
Purchase of forestal land.....	950,000
Total	M. 2,450,000

Recapitulation.

Total revenues	M. 58,056,000
Total expenditures.....	31,787,000
Hence, surplus	M. 26,269,000
Less extraordinary expenditures.....	2,450,000
Net surplus revenues.....	M. 23,819,000

FOREST PLANTING AND CULTURE.

It is a principle of Prussian forest administration to obtain as high a net profit as possible from the utilization of forestal products, or, in other words, to obtain the largest possible quantity of most valuable wood products within the shortest possible time.

By competition of substitutes for firewood, the production of forests has declined in value, and threatens to decline still more. Much attention is bestowed upon growing wood for timber and lumber, especially in the extensive beech forests of the districts. As regards the

SELECTION OF WOOD SPECIES,

much attention is paid to intermingling leaf with needle trees, experience having taught that this contributes much to the diminution of damage by caterpillars; conduces greatly to the growth of needle or coniferous wood, and increases the financial profit.

Among leaf or deciduous wood it is especially the oak, the plantation of which among coniferous trees in many cases is highly advisable and profitable.

As a rule the administration aims at growing oaks either in beech forests, or, as the case may be, in fir forests, by planting them in single groups or clusters in deeply dug fresh ground. To this end places are chosen which allow a reasonable hope that at least a small number, say 20 to 40 oaks per hectare for timber use, may be grown successfully.

The culture of oak for bark wood is restricted to grounds unfit for the growth of timber oak. In the selection of the

WORKING METHOD,

the "high-clearing system" is preferred in every place where rough and steep ground does not require a regular "pläntner" system (cultivating all ages of trees promiscuously), while in case of stocking with leaf wood, the "low-clearing" system is resorted to.

The usual rotation or renewal of stock is for the different species of trees, in case of high-clearing system, as follows:

	Years.
For beech.....	90-120
For pines and firs.....	60-120
For oak.....	140-160
Alder and birch.....	40-60

The time of rotation in case of low-clearing system varies much according to the condition of the ground where trees are grown and of the market. One year's rotation, in case of willow for cutting rods used in making baskets, is quite extensively adhered to. But in order to give such stocks chance for recovery, it is customary to let them attain, at certain intervals, a three or four years' age.

For replanting beeches self-seeding is resorted to, as a rule, without waiting too long for having openings refilled, in which latter case an early clearing, and a so-called "*cultur aus der hand*" (hand-culture) is deemed requisite.

In principle it is not customary to provide generally for certain methods of culture, but to leave it to the discretion of the local administration to select the most suitable method. Changes may, however, be introduced gradually as experience makes such advisable. The experience of forestal officers in this respect is highly appreciated.

With regard to the quantities of seed and the space between the plants, it is desirable that "too much" and "too little" are avoided.

It would require the knowledge and experience of a man trained in forestal high schools to prepare a useful and lucid report on all the particulars having reference to this subject. I can only confine myself to general observations. For fuller information permit to refer to a treatise just published on the whole forestal science ("*Lehrbuch de Forstwissenschaft*") by Dr. Carl von Fischbach, Chief Council of Forestry.

FORESTAL SCHOOLS.

The course of instruction for the State Forestal Service differs according to the future employment in subordinate situations of the so-called "Forest Protective Service" or in the higher places of the so-called "Forest Administration Service."

The training for inferior places in the forest service, such as foresters, and their assistants, is of a plain, practical character. It is, however, provided that they must prove previous service in the Corps of Riflemen, and fitness in physical, moral, and forest-technical respect.

The course of instruction for the Royal Forest Administration Service requires the production of a certificate that applicant has passed all classes of a gymnasium or of a so-called *real schule* of first class, and left the school as *abiturient* (one who has laudably passed examination in several languages, natural sciences, mathematics, geography, &c., best, perhaps, comparable to a bachelor of arts), with the difference, however, that in Germany the courses of study in the schools mentioned are of a universal and comprehensive character, without any direct regard to the profession (whether divinity, law, medicine or philosophy) the young man may choose after he left the gymnasium or *real schule*.

It is held that without such a previous general school education professional studies in forestry would not be satisfactory.

The practical training in forestry commences with at least seven months' preparatory study with a royal chief forester. Upon the expiration of this period he receives a certificate and the title of a *forst eleve* (forest pupil). As such he has then to visit for $2\frac{1}{2}$ years either a forest academy or a similar institution connected with a university. Here he has to pass his first exami-

nation in forestal sciences before a board of examiners appointed by the Minister of Forests. If he passes that examination successfully he receives the title of a *forst candidat* (candidate of forestry). As such he has to take the oath of a state officer. He is now placed with a surveyor and must pass another examination as surveyor. His education is continued under the guidance of an able chief forester in forests. Here he must complete his practical course within at least two years, aided by self-study and participation in all forestal affairs. After this, and after absolving one year's service in the army, he is permitted to apply for final examination to the chief board of examiners at Berlin. After passing this examination he receives the title of *oberförster candidat*, and is entitled to a position of chief forester whenever a vacancy occurs.

Prussia has two forest academies, Eberswalde and Münden.

The course of study at the academy, for instance at Eberswalde, is as follows:

SUBJECT.	INSTRUCTOR.
Forest culture in general, method of forest appraisement; the manner of keeping and rendering accounts of revenues from and expenditures made on account of forests.	Director of the Academy.
Protection of forests: utilization of same and huntsmanship.	A master forester.
History of forest-culture and forestal statistics.	do.
Geodesy and draughtsmanship.	do.
Mathematics; physics and mechanics.	A professor.
Botany.	do.
Zoölogy and entomology.	do.
Mineralogy, geology and chemistry.	do.
Prussian civil and criminal law.	do.

Excursions are made into the forests three times weekly, combined with lectures and practical demonstrations.

DESTRUCTION OF FORESTS, CAUSES AND RESULTS.

Many great countries, which flourished in former times, have, by devastation or extermination of their forests, fallen into pauperism and cultural decrepitude.

In consequence of the extirpation of forests of the "Nehrungen" (low ground on the Baltic coasts), in the 17th and 18th centuries, the sea coasts are unprotected. Moveable sand now covers vast fertile tracts in adjacent districts. Villages, where the farming population lived in prosperity, have disappeared, or fallen into ruins.

In the central or eastern provinces, having level and light soil, sand mounts and hills have been, to a greater or less extent, blown away, and

swamps have appeared where previously forests covered the sand or absorbed the stagnating moisture. In the Northern Hanover tracts of land, where in former times grew leaf-woods, are now deserts and waste land (the so-called "Lüneburg Haide" Heath), open to violent hurricanes, offering now-a-days nothing but a poor food to sheep, while the progressive formation of stones obstructs all endeavors either to prepare arable land or to renew foresting.

In the western provinces, which are rich in mountains, the fertile forest soil, the result of a thousand years' leaf and needle nourishment, has disappeared from the heights of the mountains. The scorching rays of the sun, wind and storms rendered the ground arid and unproductive. Rain and snow-water have carried what little soil remained down into the valleys, and even the latter have not been benefited. The crude and sterile soil of the mountains, rubbles and pebbles have followed and filled the valley with mud and fragments.

The ranges of mountains are barren and hardly afford pasture even for sheep and goats; in the valleys the fertile meadows have disappeared; again and again they are torn up by the torrents which, not restrained or absorbed by covers of moss or leaves, rush down the slopes and, particularly in the spring, if accelerated melting of the snow sets in, cause ruin and despair.

The masses of water, which, owing to their rapid descent, assume up to their emptying into the sea, a larger head, defy all dams and dikes.

Moisture is no longer returned to the atmosphere, neither by exhalation from forestal plants nor by evaporation from leaves and loose forest soil. Forests break no longer the violence of storms, and high-moors, successively arising from cleared tracts, develop every season vapors and fogs which extensively destroy vegetation.

THE INFLUENCE OF FORESTS UPON THE ELECTRICITY OF THE AIR AND UPON HAIL-STORMS

seems to be no irrelevant reason for preserving woods. Observations have been made in Southern Germany; localities were pointed out where, after high class clearing, the hail-storms had increased in a remarkable degree. Other localities were shown where hail-storms were less frequent and, in some instances, had ceased altogether, where a new forest-growth had succeeded a cleared area. Forests of great extent are said to prevent the formation of hail. But in this respect a marked difference has been observed between coniferous and deciduous woods. And it is stated that places in which coniferous forests predominate, are more rarely visited by hail-storms than places where deciduous forests largely preponderate.

MEASURES OF THE GOVERNMENT.

The Government of this country has, however, not been slow in endeavors to further, as much as possible, the preservation and culture of forests by proper instruction and by strengthening the influence of forestal and agricul-

tural associations by providing for cheap or gratuitous distribution of forestal seeds and plants as well as by direct appropriation of funds in the form of premiums for wood growing. Of wood plants at cost price there have been furnished during the last thirteen years, on a yearly average, 31,675 pieces leaf-wood plants, and 424,688 needle-wood (coniferous trees) plants.

RESULT OF SUCH MEASURES.

A full and satisfactory result in that respect has been obtained in the Eifel district of the provincial governments of Coblenz, Trier, Aachen (Aix-la-Chapelle). The deplorable state of things there, caused by a former merciless devastation of forests, and the injurious influence from the desolate and marshy heights of the Eifel far extending into the fertile fields of the Rhine districts, made it incumbent upon the state government to provide for energetic remedies. As the most important and available expedient appeared to be the reforesting of the Eifel heights, especially the environs of the "Hohe Venn" by erecting a "forest mantle," cutting off and including the climate of the "Venn;" and as the communities to which this waste land belongs were entirely unable to bear exclusively the expense for this measure, the Prussian state has, since 1854, appropriated annually considerable funds to attain the desired object.

Taking, for instance, that part of the "Hohe Venn" which is situated in the arrondissement of Malmédy and Montjoie (about 8,000 hectares in area) 2,294 hectares were to be planted with forest. In 1891 it is expected the whole plan will be carried into execution. Up to 1881, when 1,600 hectares had been stocked again, the following amounts were expended :

1. For culture and drainage.....	M. 217,925
2. Surveying and maps.....	1,742
3. Rewards to foresters	4,005
4. Rewards to others.....	3,067
Total.....	M. 226,739

averaging 141.71 marks per hectare.

All these costs were paid by the state, though the land belonged to communities. In other districts where waste land was stocked the total expenditure per hectare amounted to 68.54 marks, 80.96 marks, and 44.36 marks, respectively.

Also in other parts of the kingdom of Prussia where it became necessary to meet climatic or other dangers to the commonwealth the Prussian government has encouraged wood growing on waste land by paying bounties, &c. This was the case in the Westerland, Eichsfeld, Northern Hanover, &c. On a yearly average about 48,500 marks were expended to cover about 1,000 hectares (2,500 acres) with forests. As a rule 48.5 marks per hectare are appropriated by the state to that effect.

The general interest aroused in recent years manifested itself towards passing a law to protect forests. Such a law, to which I shall recur under the

following head, "Forestal Legislation," was passed July 6, 1875. If the same does not formally abandon the principle of free action of forest owners in the use of private forest property, yet it restricts the rights of the owner as far as required to avert damage from other real estates in case the damages surpass considerably the disadvantages arising from such restrictions. For this purpose it has been considered admissible to provide by law not only for the culture of forests, but also for other protective measures. They can be taken upon the application either of one of the parties whose interests are endangered or of the proper authorities in whose district the respective tracts are situated. For the restrictions so provided for full compensation must be borne by the party making the application. But up to the amount of value of the damage to be averted the owners of the estates exposed to damages, &c., have to contribute to the expenses for the removal of quicksand, and also in cases where the soil is washed and sliding into steep ground. The owners of real estates are liable to pay contribution up to the amount of surplus of value which their estates gain by protective measures and grounds.

FIXATION OF SEA DUNES

cannot be demanded under the law; but the same shall be applicable in cases of reduced depth of rivers, of injurious action of the wind in open tracts of land, and in the vicinity of the seas, provided such evils are caused by the devastation of forests.

The fixation of sea dunes is stated to be difficult and very expensive, considering the insignificant yield of woods to be stocked on the tracts, and the destitute condition of the inhabitants of the coasts. Forestal legislation has therefore refrained from acceding to the question of fixing dunes. Inasmuch as thereby interests of navigation are concerned, the Prussian Minister of Public Works assumes the task to fix the dunes nearest to the sea by growing some species of sand grass.

The territory consisting of dunes around the Baltic coast embraces 32,659 hectares. It is intended to erect a girdle of forests of common firs and mountain pines (*pinus montanus*) to protect the surrounding fields against quicksand.

SANDY TRACTS OF THE INTERIOR LAND.

Their fixation comes within the sphere of the Prussian Minister of Agriculture and Forests.

Prussia has about 37,448 hectares of such land, of which 28,635 hectares have been denoted as dangerous to adjacent states.

Legal measures have not as yet been taken to provide for remedies in that respect. It is stated that a considerable part of these sandy tracts could be fixed if it was rigidly forbidden, which recently has been done by mere police regulations, to drive cattle upon them.

FORESTAL LEGALIZATION IN PRUSSIA.

The duty incumbent on the state to provide for the maintenance and promotion of the welfare of all its citizens is to be regarded as a continuous

task and as a connected whole, and establishes for the government not only the right but also the duty to submit the economy and culture of all forests and woods to its supervision and influence to such an extent, as it is indispensable to avert—in maintaining as much as feasible free action of the forest owners—dangers which an unrestricted use of forests on the part of the owners threaten to entail to the detriment of the general welfare.

This general principle was embodied in ancient forestal regulations of the Prussian provinces as well as in Prussian common law and in numerous later ordinances, reaching, for some parts of the Rhine Province, as far back as the year 1814.

Under the Prussian law a devastation of woods, as contravening to the principles of forest culture, was interdicted and punishable.

Even if the sovereignty over forests in this direction was exercised only in a very loose way, its effects were undoubtedly favorable, since legislation offered a clue for the state power to act upon the cultivation of even common or private forests. By a royal edict of September 14, 1871, however, all provisions limiting the use of private forests—as far as the rights of third persons were not affected—were abrogated, a measure much deplored since in forestal circles.

Aside from a few irrelevant exceptions, especially in provinces subsequently annexed by Prussia, there existed, at the time of the promulgation of the Prussian law, July 6, 1875, (to protect forests and forest corporations) neither laws restricting the rights of the owner of private forests in the free disposition of his forest nor a right of the government to exercise a supervisory power over private forests.

By section one of the said act it is expressly provided that the utilization and management and cultivation of forestal estates in the whole kingdom is subject only to such police restrictions as are prescribed or admitted by the said act.

MERITS AND DEMERITS OF FREE FOREST CULTURE.

The emancipation of forests owned by private parties from the supervision of the state has, it is conceded, contributed materially to the increase of the production of soil; but frequently conduced also to a considerable decrease of the same, and had in its consequence very great disadvantages to the commonwealth.

The edict of 1811 (above referred to), by aiming at removing all fetters weighing upon real estate from old times, Chief Forester Donner, in a very valuable treatise on the subject, says: “overlooked, over and against the blessing of free action, the dangers thereof with regard to forests and disregarded the difference which in this respect exists between forest and field. The act of July 6, 1875, it is true, is indicative of a change of views; but in general it continues to adhere to principles of the above edict.

“Forests are property in trust, coming from old times to us by descent, the value of which does not consist in the immediate yields of wood, but substantially in the utility which it indirectly affords by its influence upon

climate, temperature, protection, conservation of soil, &c., hence to the civilization and culture of the whole country. The forest is of importance not only in the present time and for the proprietor alone, but it has a great bearing also upon the future and the whole population.

"Only indolence and selfishness can ignore such irrefutable truth.

"To proceed against both, if they become a danger to the commonwealth, and this they are already to a high degree, is a duty of legislation.

"Not the diminution of wood production; not the laying of obstacles in the way of supplying the wants of wood-workers, &c.; not the rise of wood prices; nor the fear of scarcity of wood, would authorize the state to encroach upon the liberty of owners of private forests and of private forest culture. But the state is obliged to do so, considering the disadvantages which accrue from the devastation of forests in certain situations and localities to the well-being and existence of certain districts and its inhabitants."

A step to stock waste lands with forests was taken in Prussia by passing the act of August 14, 1876. Under this act the communities are, under certain conditions, held to grow wood on such of their uncultivated lands as are not suitable for permanent agricultural or industrial purposes. In these cases the state contributes partly funds to assist poorer communities.

THE PRESERVATION OF EXISTING FORESTS

was also an object of legislation, as already stated above. Section four of the so-called forest protective act of July 6, 1875, contained a provision which made partition of joint possessions in forests difficult, such partition mostly causing a total ruin of the woods.

The act of March 14, 1881, good for entire Prussia, relating to joint possessions in forests forming a continuity of woods and clearings, places them under the control of the state, and admits a partition only if woods are not fit for a forestal cultivation, or if ground and soil can be permanently utilized for other than forestal purposes at a greater advantage.

Forests belonging to communities and public institutions, such as parishes, churches, schools, hospitals and other charitable institutions are likewise under the supervision of the state, though the extent of such power varies in the different parts of Prussia. A uniformity exists, however, in regard to the employment of forestal officers for them in places which do not require a higher qualification than that of a royal forester.

SOURCES OF LUMBER SUPPLY.

Prussia alone derived from State forests a revenue of 28,891,409 marks for lumber within the fiscal year ending March 31, 1886.

The total quantity of lumber imported into Germany for consumption (special commerce) amounted, in 1885, to 26,231,675 100-kilograms (= 2.2 centners).

Lumber exported from Germany, 5,286,988 100-kilograms.

This shows that the quantity of lumber imported into Germany exceeds by about 21,000,000 of double centners (= 100 kilograms or 2.2 centners English) the amount exported.

a. Lumber, and timber worked or hewn with an axe roughly, but not sawed in the direction of the longitudinal axis, was imported chiefly from—

	100 kilograms.
Austria-Hungary.....	5,023,853
Russia.....	11,014,500
Sweden.....	117,409
United States.....	110,756
Netherlands.....	73,513
Norway.....	56,958
Mexico and Central America.....	40,528
France.....	37,919
Switzerland.....	34,484
Great Britain.....	19,609
Belgium.....	15,714
Denmark.....	12,295

b. Of lumber and timber, hewn with axe and sawed in the direction of the longitudinal axis, there were imported largest amounts from—

	100 kilograms.
Russia.....	2,891,422
Austria-Hungary.....	2,770,108
Sweden.....	2,366,981
Norway.....	492,687
United States.....	104,297
Switzerland.....	69,506
Netherlands.....	68,975
Belgium.....	50,383
France.....	14,395

TRADE IN LUMBER.

As stated before, Russia is at the present time the principal dealer in lumber. Russian Poland, provided with excellent water courses for floating wood, formerly furnished large quantities of wood and lumber, but it now appears that Poland has exhausted its stock and furnishes very inferior qualities (for instance, lathes and wall plates), which, on account of the higher rates of duty, (Amended Tariff Act of May 22, 1885,) is no longer profitable to import.

Other parts of Russia still furnish excellent woods, particularly heavy oak, but the facilities of transportation are so limited that no favorable results for importation are anticipated. Some Berlin importers bought, about a year ago, some extensive forests in a distant part of Russia, but the result of their enterprise is not known to me.

Wood from the royal forests of Prussia commands a high price. The quantity permitted to be sold does not approximately meet the demand. Many establishments, dependent upon a supply of particular classes of wood for manufacturing purposes, complain, and, unable to obtain the required

supplies from other sources, are subjected to constantly increasing prices. Still, the forestal administration try their best to produce as much timber and lumber as possible, disregarding more and more the production of wood for fuel. Some manufacturers, particularly frame, moulding, and furniture makers, would gladly derive supplies from America, but, notwithstanding the formidable progress of this industry in Germany, the high duties of Germany appear to form, at least at present, an insurmountable obstacle.

DUTIES ON WOOD IMPORTED INTO GERMANY.

Timber and cabinet wood: 1. Worked or hewn with axe or saw roughly or solely in a diagonal direction, with or without bark, oaken barrel staves, per 100 kilograms, 5 cents, or $28\frac{1}{2}$ cents per 1 solid cubic meter. 2. With the axe roughly hewn in the direction of the longitudinal axis, or otherwise prepared or split than by rough hewing, barrel staves not coming under 1., unpeeled osiers and hooping rods, hoops, felloes, and spokes, per 100 kilograms, $11\frac{1}{2}$ cents, or, per 1 solid cubic meter, 59 cents. 3. Sawn in the direction of the longitudinal axis, unplaned boards, sawn square timber, and other sawn and cut articles, per 100 kilograms, $23\frac{1}{2}$ cents, or, per 1 solid cubic meter, \$1.42 $\frac{1}{2}$.

ADDRESSES OF DEALERS IN WOOD SEEDS AND SPROUTS.

E. Benary, Erfurt.

L. Späth, Rixdorf, near Berlin.

Le Cog & Co., Darmstadt.

Bottcher & Voelker, Grosstaharz, near Gotha.

COPIES OF FORESTAL LAWS.

I beg leave to enclose copies of the following Prussian forest laws:

1. Forestal Theft Act of March 31, 1837. [Out of print. Replaced by act of April 15, 1878.]
2. Act of July 6, 1875, relating to protection of forests and forest corporations.
3. Act of August 14, 1876, relating to the administration of woods belonging to communities and public institutions within the eastern provinces of Prussia.
4. Act of April 15, 1878, relative to forestal thefts.
5. Act of April 1, 1880, relating to forest and field police.

GERMAN PENAL CODE.

SEC. 117, *ibid.* Provides that whoever obstructs by threats or force foresters, forest owners or their officials in the legitimate exercise of their official duties shall be punished by imprisonment for a term not exceeding three years.

SEC. 118. If such resistance or assaults result in bodily injury of the person assaulted, imprisonment in a house of correction for a time not exceeding ten years.

SEC. 119. If such acts are committed jointly by several persons, the punishment in each case can be increased by one-half beyond the above-stated terms.

SEC. 308. Wilfully setting woods on fire, if there are mitigating circumstances, imprisonment not less than six months.

SEC. 368. Neglect to destroy caterpillars, as prescribed by law or police regulations, shall be punished with a fine up to 60 marks or imprisonment not exceeding fourteen days.

Subject to similar punishment are persons who kindle fires in dangerous places of forests and woods and who enter or drive cattle into nursery forests which are surrounded with a fence or the entrance to which is interdicted.

SEC. 370. Forbids the unlawful diminution of forestal land by digging or ploughing.

In conclusion of this, my report, I wish to refer parties interested to some other highly valuable books on forestal matters, of which I transmit copies:

1. Compendium (already alluded to) of Forestal Science, by Dr. Fischbach.
2. Compendium of Utilization of Forests, by Dr. Glayer.
3. Handbook on Forest Administration Science, by Dr. Schnappach.
- 4-5. Russian Forests, by Chief Forester Donner.

STUDENTS SHOULD VISIT FOREST SCHOOLS IN GERMANY.

It is a matter of regret that, notwithstanding many hundreds of young Americans enter annually German universities, polytechnical, and other schools, very few, if any, avail themselves of the advantages which are offered by a course of studies at the renowned forestal academies of Eberswalde and Münden.

F. RAINE,
Consul-General.

UNITED STATES CONSULATE-GENERAL,
BERLIN, *March 18, 1887.*

ANNABERG.

REPORT OF CONSUL GOODWIN.

There is probably no country in the world where higher revenues from the forests are got than in Saxony, nor where greater or more intelligent care is bestowed upon them. Nearly all kinds of trees which grow in any part of Germany are found in Saxony, but in this consular district, a mountain region, firs and pines, *nadelhölzern*, chiefly firs, the very trees from which the wooden toy-trees we played with in our childhood were modelled, and which, when we grew older, we thought were too precise and stiff to be like any real trees, are chiefly grown, and the existing forests are composed almost entirely of them. In the adjoining city of Buchholz (*beech wood*) there were doubtless many years ago forests of beech of considerable importance, for the place was known as "St. Catharinenberg im Buchholz" (*St. Catharines-in-the-beech woods*) until early in the sixteenth century, when the long name was shortened into Buchholz. At present, however, the forests in and around Buchholz are composed entirely of firs. In the four forestry districts of Marienberg, Annaberg, Schwarzenberg and Auerbach the wooded land amounted in 1878, the date of the most recent general official report, to about 83,600 hectares (1 hectare = 2.471 acres) or about 48 per cent. of the

entire area. The wooded land belonging to the state in the four head-forest districts of Marienberg, Schwarzenberg, Eibenstock and Auerbach, which include also portions of the districts of Freiberg, Flöha and Zwickau, and of Oelsnitz and Plauen, amounted in 1885 to 72,682 hectares. As to private forests no accurate details can be given, as their management is left to their proprietors, and as no inquiry as to their improvement has been made for a number of years. In this consular district there are only forests belonging to the state, to private persons and to communities. Those owned by individuals are not extensive, nor are those owned by communities. To the south of Annaberg there are no common forests, but Annaberg itself, and the neighboring towns of Ehrenfriedersdorf and Geyer, have possessions in this way. The only private forests of any size in this immediate section are in and around the two last-mentioned towns. There are none belonging to the king.

FOREST PRIVILEGES AND ORGANIZATION.

In the state forest pasturage is not allowed, nor do the people have any privileges in them, save that the poor are allowed to gather the brushwood which remains unused, also the berries and mushrooms. The state forests are divided into four districts and forty-five sub-districts. The first are managed each by a chief warden and the latter each by a high forester, who has under him the necessary assistants for the cultivation and protection of the forests, viz., forester, assistant forester and warden. The financiering is in the hands of five forest financiers, whose headquarters are at Marienberg, Annaberg, Schwarzenberg, Eibenstock and Auerbach. The quantity of wood felled in the state forests in the year 1885, the last for which a report has been made, amounted in the four forest districts, exclusive of brushwood, to 380,074 *fest metres*, of which 321,813, or 85 per cent., was suitable for and used for timber.

REVENUE.

The gross revenue was as follows :

Wood.....	M. 5,487,150
Hunting.....	4,786
Use of open ground, meadows, quarries and turf lands	108,155
	<u>M. 5,600,091</u>

The expenses were as follows:

For inspection and management, inclusive of M. 70,748 for keeping the buildings of the forest service in good condition	M. 584,371
For forest improvement, cultivating, drainage, &c.....	310,554
For expenses of felling and all sundry expenses.....	739,100
	<u>M. 1,634,025</u>

There was therefore at the close of the year the handsome showing of a net profit of 3,966,066 marks, or 52 marks and 43 pfennige per hectare, reckoning the entire area of state forests in the district, including open grounds.

DESTRUCTION OF FORESTS AND REFORESTING.

As to destruction of forests, it may be said that they suffer occasionally from severe winds, heavy snow falls and thick accumulations of ice, but seldom, and to a small degree, from fire. From no cause is the damage of great consequence, as all injured spots are at once recultivated. There are no sand dunes or waste places within the limits of the state lands, and reclamation of such places is unheard of, as every foot of ground is cultivated to an extent not surpassed in any European country with the exception of Belgium and the Netherlands.

There are no private sellers of seeds and shoots in this district. They can probably be had from the government officials and perhaps from the foresters who have charge of the forests owned by the cities of Annaberg, Ehrenfriedersdorf and Geyer. The forest authorities in this district are all under the control of Land Forstmeister von Witzleben, whose headquarters are in Dresden, and who is the highest authority in forest affairs in the kingdom. The salary of this official is 6,000 marks (\$1,428), and under him are the *oberforstmeisters* at Dresden, Moritzburg, Schandau, Grillenburg, Bärenfels, Marienberg, Schwarzenberg, Eibenstock, Auerbach and Zschpan, whose salaries are 4,500 marks each, or \$1,071. Next in rank come the *oberforsters*, who, in all Saxony, number 113, and then the *forsters*, *wald-waerter*, *forstschutz* and laborers. The cultivation, planting and cutting is ordered by the *oberforsters*.

FORESTRY SCHOOLS.

The Saxon forest academy is located at Tharandt, a delightful village on the line of railway between Freiberg and Dresden, having 2,500 inhabitants, and prettily situated at the junction of three valleys—the Dresdener Thal, Bade Thal and Graustein Thal.

The academy was founded in 1816, and to it Saxony owes for the most part its enviable forests and the very profitable management of them. The number of students varies from year to year, from 120 to 150—about half Germans half foreigners. I enclose herewith a copy of the last annual report of the academy (1886). The institution is most ably conducted by Dr. Judeich, the chief director and instructor, whose salary is 9,000 marks (\$2,106).

The faculty consists of the chief instructor and nine others, viz: Prof. Dr. Krutzsch, Prof. Dr. Nobbe, Prof. Kunze, Prof. Dr. Nitsche, Prof. Neu-meister, Prof. Dr. von Schröder, Prof. Dr. Weinmeister, Prof. Lehmann and an assistant instructor, Herr Zeumer. These instructors receive salaries ranging from 2,700 marks (\$642.60), the lowest, up to 5,100 marks (\$1,213), the highest. The different departments over which these instructors preside is stated in the annual report.

AGES OF TREES.

The *nadelholz*, at least some of the species, attains a wonderful age; indeed, according to Gericke, in his work "Ueber das Alter der Deutschen

Waldbäume," it has attained a greater age in Germany than any other tree. A peculiarity of the *nadelhölzern* is, that as soon as they have reached the highest limit of healthy condition they die, while the foliage trees often continue to vegetate for a long time. Next to the *nadelhölzern*, writes Gericke, the greatest ages to which trees in Germany are positively known to have lived are from 500 to 570 years. The pine in Bohemia and the pine in Norway and Sweden have lived to the latter age. Next comes the silver fir, which, in the Bohemian forests, has stood and thrived for 429 years. In Bavaria the larch has reached the age of 274 years. Of foliage trees the oak appears to survive the longest. The best example is the evergreen oak at Aschoffenburg, which reached the age of 410 years. Other oaks in Germany have lived to be from 315 to 320 years old. At Aschoffenburg the red beech has lived to the age of 245 years, and at Weisswasser to the age of 226 years. Of other trees the highest known ages are ash, 170 years; birch, 160 to 200 years; aspen, 219 years; mountain maple, 224 years; elm, 130 years; red alder, 145 years.

I will take the liberty to make public the following letter which I received from Herr Dr. Judeich, chief director of the Royal Forest Academy at Tharandt, a gentleman of deep learning and an authority on all matters pertaining to forestry:

ROYAL FOREST ACADEMY,
THARANDT, SAXONY, *December 31, 1886.*

GEORGE B. GOODWIN, ESQ.,
U. S. Consul.

Dear Sir: You are certainly quite right when you speak of the importance of forest culture for the United States, but allow me to express my belief that no earnest work in that direction will be accomplished there. The culture of the forests proceeds too slowly to suit your countrymen, and the profits are not forthcoming soon enough. A few prominent men have taken an interest in the matter, to my knowledge, for instance, Prof. Lene, of Cincinnati, who helped to establish a forestry congress, and with whom I have exchanged letters several times. But nothing of importance has come from his efforts. A young Saxon forester, who several years ago went to America and remained there for quite a while, at my request, is of the same opinion as I am, viz.: that nothing can be done yet in the United States. The late Franklin B. Hough, as is well known, interested himself very much in the matter. His report upon forestry, prepared under the direction of the Commissioner of Agriculture, "in pursuance of an act of Congress, approved August 15, 1876," and published at Washington in 1878, contains among other things many interesting notes about the manner of teaching forestry in Germany and Austria. As a whole, these notes are correct as applicable to the present time, but since they were written the Wurtemberg Forest Academy has been removed from Hohenheim to the University of Tübingen, and the Bavarian Academy to Munich. Your countrymen therefore, have every opportunity to inform themselves upon forestry matters with the aid of their own literature. Should you desire to become acquainted with the tuition of forestry in Germany, and to keep pace with the most advanced thought upon the subjects pertaining thereto, I would recommend that you procure through your bookseller the second part of the forest and hunting calendar, published by Springer, of Berlin. You might also find valuable information in the volumes of "Hand-book of Forestry," (*Hand-buch der Forstwissenschaft*,") to be had from Lorey of Tübingen, Lampsche book-stall. The third and fourth volumes contain interesting and important particulars. In my opinion good results from forest culture can only be had in the United States when the government shall

have taken the matter into its own hands and when, under its auspices, some intelligent and energetic persons shall have been sent to Germany to be taught forestry, including the practical management of forests. As things are now such persons find no sphere of activity in the United States. The Japanese have already made greater progress than the people of the United States, for they have made arrangements to teach forestry, and at present three Japanese, very able men, are pursuing studies in forestry at this institution.

Yours truly,

DR. JUDEICH,
Chief Director.

I wish to extend my thanks to Dr. Judeich for his courteous response to my request for information, also to Herr F. W. Mehvert, Forstrentmeister, of Annaberg, for like courtesies, he having supplied the facts and figures which I have been able to furnish relative to the expense and profit of forest culture in this district.

GEORGE B. GOODWIN,
Consul.

UNITED STATES CONSULATE,
ANNABERG, SAXONY, *March 20, 1887.*

SILESIA.

REPORT OF CONSUL DITHMAR, OF BRESLAU.

FOREST AREA.

The total area of Silesia is 4,029,141 hectares (1 hectare = 2.471 acres), of which 1,164,628 hectares are woodland. Of this woodland about 160,000 hectares consist of deciduous trees, the remainder of pines, firs, and the deciduous coniferous larches (classified with the pines). The state forests comprise 170,449 hectares; those belonging to cities, towns, and communities, and corporations, 145,970 hectares, all under the control of the state authorities. Of the forests owned by Prince Albrecht, of Prussia, by the King of Saxony, by various mediatised houses, and by the wealthier Silesian nobility, the larger ones are respectively 29,392, 28,897, 27,338, 24,941, 21,586, 19,981, 19,345, 17,588, 14,444, 12,836, 11,000, 10,000, 9,546, 8,267, 8,115, 7,864, 7,278, 6,766, and 6,477 hectares in extent. Other private forests cover from 50 to 6,000 acres.

Beside lumber and cord wood, for both home consumption and export, the Silesian forests supply large amounts of timber for the mines. About eighty woodpulp and cellulose factories situated in the province also consume large quantities of wood. In 1882 seventy-five of these factories produced 209,000 hundred weight of woodpulp.

Large numbers of rafts float down the Oder river whenever there is sufficient depth and width of water, many of them bound for Stettin, Hamburg, and Berlin. The dams and locks at this city, however, are a drawback to this method of lumber transportation, necessitating the construction of narrow and short rafts, which can pass through the locks in two sections.

TREES.

In the forests of the low lands pine and oak trees predominate, but the larger forests on the right of the Oder consist almost exclusively of pines. The oak forests in the valleys of the Oder and Neisse are decreasing in number and size, but are still of considerable extent in the neighborhood of Ohlau, Breslau, Brieg, Leubus and Neusalz. The royal hunting forest near Ohlau comprises many fine specimens of old deciduous and evergreen trees. Larch, birch and beech forests are to be seen at Trebnitz, Münsterberg and Nimptset.

FOREST PRIVILEGES.

Common forests, or such in which the population at large have privileges, do not exist. Pasturing cattle is occasionally permitted, against remuneration, if the cattle are under the care of a herdsman. Swine are also frequently admitted into the forests if they are properly guarded. They are thought to be destructive of insects and their eggs.

FOREST ADMINISTRATION.

The three administrative districts into which Silesia is divided have each a head forest master, who is a member of the district government, and to whom are subordinate the various head foresters having supervision of the state, city and communal forests. Under the control of the head foresters are the foresters, gamekeepers and guards, and the wood laborers. The planting and felling of trees are regulated by the head foresters under general or special instructions. Among the duties of the foresters are the protection and preservation of the trees and game; the selection of sites for wood cutting, making reports on drainage and irrigation, the disposal of cord and dead wood, and the prevention of violation of the game laws, whether by the gaming lessees or by poachers. All grades of foresters are entitled to a pension when too old or otherwise incapacitated for service. Wood can be cut in the state forests and in the communal and other forests under control of the state only in conformity with a plan drawn up or sanctioned by the forest authorities.

FOREST REVENUES.

The sales of wood from the state forests in Silesia in the fiscal year 1884-1885 yielded the sum of \$1,216,628, namely, \$841,757 from lumber and oak bark, and \$370,872 from fuel wood. In addition, the leasing of the right to shoot game in these forests yielded upward of \$5,000.

The annual product of wood in Silesia is estimated at 3.50 festmeters (1 festmeter equals about 33 cubic feet Prussian) per hectare of forest, making a total of 3,921,699 festmeters or 129,416,067 cubic feet Prussian per annum.

The gross receipts per hectare from state forests in Silesia in 1881 were: For wood, \$6.28; from other sources, \$0.56; total, \$6.84. The gross expenditures for the forests in the same year were \$2.76 per hectare; net revenue per hectare, \$4.08. For taxing purposes the revenue per hectare of woodland in Silesia is estimated at \$1.07; of tilled land, at \$4.25.

DESTRUCTION OF FORESTS.

Among the causes of the destruction of forests can be mentioned a disease of young pine trees known here as the "Schütte-Krankheit," which first manifests itself by a discoloration of the bark, which turns red, then a reddish brown. In the early spring the pine needles drop off the infected trees, beginning at the lower branches. The drying up process always begins at the points of the needles, and continues till the entire tree is dead. In the progress of the disorder the general appearance of the tree is that of a plant dying from summer heat and drought. Other causes are the depredations of field mice, of the cock chafer or May-beetle, and of other insects, and the water-spouts and tornadoes which occasionally visit the mountain district. In recent years it has been the custom to permit the pasturing of hogs in well grown forests, these animals being supposed to destroy insects and their eggs. It is also stipulated in leasing the right to shoot game that certain beasts and birds of prey shall not be killed without special permission. Especially are mentioned the hedgehog, bat, owl (except the horned owl), buzzard, and other vermin exterminators. The killing of badgers and foxes is likewise frequently interdicted for the same reason.

As a rule trees are allowed to stand until they have reached their highest value. Beech trees are usually felled at the age of 100 to 110 years; pines and firs at 80 to 100, and oaks at 120 to 160 years, while alders and birches are cut down at 40 to 60 years. In renewing the forests transplanting from seed shoots is the usual rule, but seeding alone is often sufficient, with the assistance of the woodman in thinning out and preventing the choking of the tender shoots by rank grass and weeds. When from any cause small clearances have occurred self-propagation by fallen seeds and nuts sometimes makes cultivation needless. Pines, firs, and larches mostly occupy the poorer, sandy and stony parts, the oak and the beech requiring a richer soil. In transplanting pines those of one and two years are preferred. The former method of seed culture by means of the wood and field plow is falling into disuse. The demand for hundreds of thousands of Christmas trees in December is supplied from the plantations which need thinning out, and they are cut only under the direction of the foresters. Oaks are transplanted when from one to three years old, but also frequently grow to trees from the acorn.

Uncultivated areas not suited for agricultural purposes, and unoccupied, must be converted into woodland by cities or communities owning them, unless it can be shown that such waste places are irreclaimable.

SEEDS.

Pine tree seeds are prepared (dried) at seven establishments in this province under the supervision of head foresters. The pine cones are gathered and carefully housed for the purpose. The price per kilogram of seed ranges from 60 cents to one dollar.

FOREST SCHOOLS.

A number of forest schools and academies exist in other Prussian provinces, some of which receive subsidies from the government. A state foresters' school was also opened in 1882 at Proschkau, in this district, in which sixteen pupils receive board, lodging and instruction for \$7.14 per month. Here only reading, writing, arithmetic, and the elements of geometry and physics are taught by elementary teachers, aided by the head forester of Proschkau and his assistants. The term of study is two years.

State forests in Silesia are governed by the same laws as are those in the remainder of Prussia, while the law of 1876, giving to the state the control over the forests belonging to cities or communities, churches, parishes, and other ecclesiastical corporations, public schools, higher educational institutes, benevolent institutions, &c., is identical in the provinces of Brandenburg (Berlin), Silesia, Saxony, Posen, East and West Prussia, and Pomerania.

Tree seeds and plants are sold in Silesia by Guido Drabizius, in Breslau; by Julius Knebel, in Liegnitz, and by the Graf von Nostitz'sche Pflanzenhandlung, in Zobten am Bober.

HENRY DITHMAR,

Consul.

UNITED STATES CONSULATE,

BRESLAU, *March 12, 1887.*

CHEMNITZ.

REPORT OF VICE-CONSUL MURPHY.*

FOREST AREA.

Saxony is a rolling, well-wooded country. Forests of great extent occur, especially in the neighborhood of the principal cities, and among the Erzgebirge and the hills of the Saxon Switzerland.

The dark-green foliage of the fir and larch is a distinctive feature of the average Saxon landscape, dotting the hillside with their symmetrical cones, and giving a sombre coloring to the valleys.

The entire forest area of Saxony amounts to 409,119 hectares, or nearly two and one-half times as many acres.

Of this area 59,987 hectares are given up to the growth of deciduous trees, and this area may again be subdivided as follows:

	Hectares.
Oak, whose bark has been stripped for tanning and other purposes.....	1,463
Willow	612
Stumps of various kinds, without shoots.....	9,727
Stumps of various kinds, with shoots.....	26,217
Oak.....	3,323
Birch, alden and aspen	8,882
Beeches	9,260
Unclassified.....	503

It is a notable fact that the area covered by forests of pine and kindred woods is six times as extensive as that by deciduous trees. The pine area is itemized thus:

	Hectares.
Fir.....	127,435
Larch	1,077
Pitch and white pine.....	220,620
Total pine area.....	349,132

The proprietorship of the forest area is divided as follows:

	Hectares.
Crown and state forests.....	166,287
Seventeen city parks	18,637
Charitable institutions	8,368
Corporations.....	1,885
Private estates	213,924
Unclassified	18
Total forest area.....	409,119

Forest areas which are the property of charitable institutions or corporations are managed in the same manner as those which are the property of the crown or state. The private forests are of course managed according to the pleasure of the owners; though as they usually belong to large landed proprietors, they have, as a rule, a fixed system of management.

*For the statistics contained in this report I am indebted to the kind assistance of Dr. André, Oberburgomeister of Chemnitz.

DESTRUCTION AND PLANTING OF FORESTS.

One hundred and fifty-two thousand hectares of forest lands are accompanied by agricultural management, though pasture privileges do not exist in Saxony owing to the fact that all land rights are now occupied.

The destruction of forests is carefully regulated, as far as possible, by the government, wood stealing being punishable as a penal offense.

For injuries inflicted by natural causes, such as decay, the ravages of fire, insects, &c., such remedies are applied as are known to the science of forestry.

The recovery of sandy lands and waste lands is effected by the purchase of the land and the application of the usual methods of forest cultivation.

This matter is, however, of small importance in Saxony, as lands of the character described do not occur nearer than East Friesland and Osnabrück, except in waste mountainous districts.

Another important feature of arboriculture in Saxony is the planting of fruit trees along public roads. The trees used for this purpose are cherry, plum, apple and pear.

The æsthetic advantage of this custom is apparent in the early spring when a country road is often an avenue of blossoms, while the air is filled with sweet perfumes. But the practical benefit of the system is shown by the fact that the sale of fruits raised in this manner amounted last year to 100,400 marks, or about \$25,000 of our money.

The sum accruing in this way is applied by the local boards of management to the improvement of the public roads.

Where profit is not so important as shade, as, for instance, within the limits of towns and cities, maple, linden and chestnut trees are generally used.

INSTRUCTION IN FORESTRY.

The science of forestry is considered of such importance that a forester's academy is sustained by the state at Tharandt.

The following statistics of this institution may be found of interest :

Receipts.

Entrance money and other payments from academists.....	M. 18,600
Profit from sale of forest plants	2,000
Total receipts.....	M. 20,600

Expenses—Salaries.

Director, free lodging and.....	M. 9,000
Professors and assistants	37,100
Lectures	600
Librarian	300
Register	1,440
Forest gardener	1,350
Assistant in chemical laboratory	720
House waiter	720
Total for salaries.....	M. 51,230

Other expenses.

Incidental house expenses	M. 500
Mayor of Tharandt for assistance in upholding the academic discipline	100
Academic excursions.....	2,900
Stipends for poor students.....	1,050
Support of library, natural, historical and technical collections, as well as the purchase of apparatus for geodetical and zoological practice, and for investigation in vegetable physiology	7,000
Forest garden.....	3,600
Incidentals in the chemical laboratories.....	2,300
Repairs to the academic building.....	3,000
Contribution to the "Tharandt Chronicle"	300
Miscellaneous.....	2,500
Enlargement of the academy and furnishing the new rooms.....	12,000
Total expenses.....	M. 85,580

Statement.

Expenses	M. 85,580
Receipts	20,600
Deficiency	M. 64,980

SEEDS.

Plants and young trees are sold from the offices of the royal forest districts, though communities and the larger proprietors maintain their own nurseries.

For the production of wood seed there is a plot in the forest district of Auerbach, though seeds are more generally obtained from Blankenberg, in the Hartz Mountains.

REVENUES.

The following are general statistics of receipts and expenditures for the crown and state forests in the year 1886:

Receipts.

For sale of wood.....	M. 10,687,170
Other revenues from forests.....	227,000
Hunting rents	19,500
Other receipts.....	27,000
State appropriation	25,000
Total.....	M. 10,985,670

In 1886 797,550 cubic meters of hard wood were sold at 13.40 marks per cubic meter, against 800,100 cubic meters in the preceding year at 12.50 marks per cubic meter.

The forest revenues may be itemized thus:

Various revenues from forests.....	M. 60,000
House and other rents.....	162,000
Peat cuttings.....	5,000
Total.....	M. 227,000

Expenses—Salaries.

11 high wardens of forests, with free lodging	M. 63,000
12 treasurers.....	39,300
106 high foresters.....	367,680
36 trained foresters.... }	190,200
84 untrained foresters.. }	
107 assistants	42,768
154 forest rangers and agate gatherers, and appropriation for rent of 127 aged rangers, at 18 marks.....	135,547
3 agate gatherers.....	720
2 other officers, known as forest exmpts.....	3,255
Contribution for assistance of officers of military, road, and forest bureaux.....	2,425
Subsidies to aged foresters and their heirs.....	3,000
Salaries of two teachers in the foresters' academy at Tharandt, for experiments in regard to forest matters.....	2,700
Forest police.....	27,000
Total of salaries.....	M. 877,595

Other expenses.

Incidentals in the forest office of the Tharandt district.....	M. 300
Equivalents given instead of lodging.....	14,500
Scientific investigations and travel.....	14,000
Taxes	33,000
Law expenses, copying, etc.....	2,500
Setting up prohibitory notices, etc.....	600
Interest on purchase money.....	5,000
Erecting and repairing forest buildings.....	140,000
Allowance to officers for extra expenses.....	213,200
Incidentals and traveling.....	44,000
Appropriation for needy wood-cutters	24,000
Value of fuel given to workmen.....	11,000
Other expenses of management.....	18,000
Experiments in forestry, inclusive of all expenses for meteorological observations..	10,000
Forest improvements	668,000
Wages of wood-cutters.....	1,387,740
Sundries	148,000
Total expense, in addition to salaries.....	M. 2,733,840

Bureau of Forest Management.

Director	M. 5,400
7 forest engineers.....	15,600
6 assistant forest engineers.....	10,260
1 register	2,250
1 designer	1,440
1 waiter	1,350
Heat, lights, etc.....	3,500
Extra expenses of officers and assistants	23,000
Copying and work connected with taxation.....	13,000
Allowance to director, register, and attendants for expenses incurred in overlooking corporation and private forests.....	1,800
Incidentals and traveling expenses	16,500
Other managing expenses.....	12,500
Total.....	M. 106,600

Statement.

Total receipts.....	M. 10,985,670
Total expenditures—salaries.....	M. 877,595
Other expenses	2,733,840
Bureau of Forest Management	106,600
	3,718,035
Surplus	M. 7,267,635

The following works on forestry are recommended by the oberburgo-meister of Chemnitz: Judeich—"Forest Management"—Dresden, 1885; Quenzel—"Science of Forestry"—for Saxon officers; "Compendium of Forest Management," Dr. Prof. Albert; "The Forest Guard," published by P. Parey, Berlin; "The Forest Guard and Nurse," by Dr. Grabe, Gotha; "Sowing and Planting According to Forestry Practice"; "Handbook of the Value of Forests," P. Parey, Berlin; "Utility of Forests," P. Parey, Berlin; "Forest and Chase Dictionary," P. Parey, Berlin.

GEO. H. MURPHY,
Vice-Consul.

UNITED STATES CONSULATE,
CHEMNITZ, *February 5, 1887.*

KINGDOM OF PRUSSIA.

REPORT OF CONSUL WAMER, OF COLOGNE.*

FOREST AREA IN THE PRUSSIAN MONARCHY.

The total area of the Prussian monarchy amounts to 35,479,536 hectares. † Of this amount 8,124,521 hectares are forests, ‡ being an equivalent of 23.33 per cent. of the total area. It may be stated that this estimate includes all land devoted to the culture of wood.

The apportionment of the forests is as follows:

- a. 29.4 per cent., equivalent to 2,374,039 hectares, belong to the state.
- b. 11.9 per cent., equivalent to 983,727 hectares, belong to the communes.
- c. 1.5 per cent., equivalent to 122,759 hectares, belong to institutions.
- d. 2.1 per cent., equivalent to 170,063 hectares, belong to corporations.
- e. 55.1 per cent., equivalent to 4,473,933 hectares, belong to private individuals.

* Considering the vast amount of technical knowledge required to fully comprehend the whole system of forest culture in Prussia, I have found it extremely difficult in preparing a report on the subject, and I am greatly indebted to *Oberforstmeister* (head forest master) von Wurmb, chief of the forest department of the government district of Cologne, for such information.

† One hectare is equivalent to 2.471 acres.

‡ The total area of forest in the Empire of Germany is 13,900,611 hectares, or 25 per cent. of the total land area.

Under the same heads the Rhenish province and the district of Cologne have the following area, respectively:

RHENISH PROVINCE.		COLOGNE.	
	Hectares.		Hectares.
<i>a</i>	143,284	<i>a</i>	11,766
<i>b</i>	321,019	<i>b</i>	7,358
<i>c</i>	7,149	<i>c</i>	1,773
<i>d</i>	15,303	<i>d</i>	1,201
<i>e</i>	342,687	<i>e</i>	98,284

The forests of Prussia stretch from the Baltic coast over the mountains of the Sudeten, Hartz, Thuringia, Teutoburg, Meissner, Taunus, Rhön, and the slate mountains of the Lower Rhine.

According to a rough estimate 4,043,800 hectares of forest area are level, 2,089,500 hectares are hilly, and 1,991,200 hectares are mountainous.

GOVERNMENT SUPERVISION OVER COMMUNAL FORESTS.

Although the communes are left free to manage the communal forests, the state government reserves for itself certain rights over the general administration in order to prevent any mismanagement or abuses. For instance, in Westphalia and the Rhineland, which embrace this consular district, the communities and public institutions are left free to administer their own forests; but at the same time the government gives certain instructions regarding the culture and utilization of the forests which the local authorities are bound to carry out without any alteration on their part not first consented to by the government. Whether it is considered best that the commune should appoint the officials entrusted with the supervision of the forest is left to the discretion of the government. In leaving the election of the forest officials to the communes they are to elect such persons whose qualifications are approved by the government, to whom the election is submitted for consideration and confirmation. It is the duty of the government, either by virtue of its office or for some special reason, to examine into any changes made in the management of the communal forests, and to proceed against all adverse administration by assuming special supervision or by instituting any other judicious precaution.

As technical organs for the supervision of the communal forests the government can make use of its foresters, who are generally bound to report to the government any wrong done to the communal forests that may come to their knowledge. The technical supervision is conducted by its technical foresters, namely, by the *oberforstbeamte* (head forest officers), and *forstmeister* (forest master). Each *forstmeister* has a special geographical district allotted to him, who has not only to superintend the state forests but also, at the request of the government Department of the Interior, of which he is a technical member, to examine the management of all the communal forests situated within his particular district. The *oberforstbeamte* (head forest officer), has general supervision over the administration of all the communal

forests situated within the government district of which he is the head, and by whom all orders are issued. The privileges of the communes in their forests consist in their having sole benefit of all the income or any other profit derived from the forests. The use of the pastures, as well as the straw and grazing, is usually permitted to the consumers whenever such use is very necessary, but is so far restricted that the condition and value of the forests and the maintenance of the pastures may not suffer thereby. The communes are bound to bring all sand dunes and waste lands under forest cultivation as soon as it is shown that it can be profitably done. On all sales of communal forest area the permission of the government must first be obtained.

ORGANIZATION AND FUNCTIONS OF GOVERNMENT FOREST BUREAUS.

The state forest administration is under the Ministry for Agriculture, Domain and Forest. The chief direction of forest affairs is divided into four heads:

1. The central direction: Forest Department in the Ministry for Agriculture, Domain and Forests.
2. Local direction: Inspection and control by the district government under the Department of Taxes, Domain and Forests.
3. District administration by the chief forester (*oberforster*), respectively the Bureau of Receipts and Disbursements.
4. Forest preservation and special superintendence over the management of the subordinate foresters (the so-called *forstschutzbeamten*). The revision of all forest accounts is done at the so-called *Ober-Rechnungskammer* (Head Bureau of Accounts) of the Ministerial Department. The entire organization is based upon the division of the state forests into so-called *oberforstereien* (forest districts). Every principal forest district is an independent administration, for whose administration a separate finance is kept, and the chief forester, who is the responsible administrator of the finance, submits all the accounts, through the forest treasurer of his district, to the Finance Department of the government for auditing.

The duty of the *oberforster* (head forester) is to watch and take care of the preservation of his forest district and to make his administration useful in every possible way. It is, therefore, the duty of the *oberforster* to possess the most exact knowledge of the working of the district confided to his care, and not to neglect visiting the forest daily, if possible. The *oberforster* is an independent officer, and is alone responsible for the duties and salaries of his assistants.

The *oberforster*, on having passed the scientific examination required by the state, is appointed by the Minister of Agriculture, Domain and Forest, and receives a definite salary, with the right of pension. His rank is that of a government assessor. The extent of each forest district varies. There are 679 forest districts in Prussia, and the average size of each district is 3,496 hectares.

The following table shows the area of state forests in the different provinces, also the number and the average size of each *oberforsterei*:

Province.	Forest area.	Oberforsterei.	Average size of oberforsterei.
	Hectares.	Number.	Hectares.
East Prussia.....	359,241	74	4,855
West Prussia	273,174	47	5,812
Brandenburg	369,510	72	5,132
Pomerania.....	170,619	42	4,062
Posen	162,029	28	5,787
Silesia.....	151,325	34	4,451
Saxony.....	169,480	55	3,081
Schleswig.....	30,111	16	1,882
Hanover.....	235,074	104	2,260
Westphalia	57,189	19	3,009
Hessen-Nassau	253,003	146	1,733
Rhine Province	143,284	42	3,412
Total.....	2,374,039	679	3,496

There is a treasurer for each *oberforsterei*. He is an independent officer and is alone responsible for the administration of his bureau. The government appoints him and he is required to give bond for the faithful discharge of his duties.

The foresters under the supervision of the chief forester (*oberforster*) are of two classes, namely, those who protect and attend to the practical management of the forests, the so-called *forsters* (foresters), and *waldwarter* (forest attendant), and the assistant foresters, the so-called *forsthilfsaufseher*. The immediate head of the chief forester is the district government, especially its department of finance, and whose organs for the administration and supervision of the forests and the finances are in the person of the *forstmeister* (forest master) and *oberforstmeister* (head forest master), the former has control over a certain number of the chief forests within the government district, and the latter over all in the government district. The *forstmeister* resides at the seat of the district government as a technical member of it. He has to personally inspect every part of the district at least three times a year, assist in carrying out the regulations of work and in adjusting the finance, in controlling and fixing the annual plans of culture and the felling of the forest, subject to the supervision of the *oberforstmeister*. Further, he has to examine all the work done in the forest and its protection, inspect the book of the *oberforster* and the accounts of the treasurer, check the forest cash account and the inventories, and inspect once every five years all the forest boundaries of every forest district within his district, and report as to their condition. As a member of the district government he has to work out all business matters which directly concern his inspection district, except in cases where the work is specially provided for. All reports of the *oberforster* to the government must be sent through the hands of the *forstmeister*.

The *forstmeisters* are appointed by His Majesty the Emperor and King, on the proposal of the Minister for Agriculture, Domain and Forest, of the *oberforsters* who have distinguished themselves by their superior technical education and business management of forests. They have not to pass any special examination for this promotion beyond the forest scientific examination originally passed and required by the government for *oberforsters*.

Forstmeisters rank as *regierungs rätbe* (government councilors). The number of *forstmeisters* at present in Prussia is 92, which is on an average of about 6 to 7 *oberforstereien* (chief forest districts) to each *forstmeister*. This estimate, however, does not include the communal forests of Westphalia and the Rhineland nor the 80 royal *oberforstereien* under the supervision of 26 *oberforstmeisters* who are the directors of the whole administration of the entire government district, and, as such, are the superior officers of the *forstmeisters*. Accordingly, there is one *oberforstmeister* for each government district, who is, by virtue of his office, a member of its department. The *oberforstmeister* is selected out of a number of the most capable *forstmeisters*, who is proposed by the Minister for Agriculture, Domain and Forest, with the sanction of the State Ministry, and appointed by His Majesty the Emperor and King. The *oberforstmeister*, having the entire forest administration of the government district, has to make annually, in conjunction with the *forstmeister*, an inspection tour and to see that the management of the forests is properly carried out. He has, under the direction of the government district president, the appointment and arrangement of the pay of the forest police according to the general instructions issued by the Minister. He has, further, the regulating of the general business, the preparing of the budget, the super-revision and approval of the annual felling and cultivation plans, the distribution of the means for the cultivation of the forests, and the disposition of the funds set apart for the entire district.

The Ministry for Agriculture, Domain and Forest contains in its department for forest the central direction for the entire state forest administration, consisting of an *oberland-forstmeister* (head state forester), a ministerial director, and four forest technical ministerial counselors, whose departments of business are arranged according to the provinces. The general regulations for the maintenance and utilization of the state property, consisting in forests, are fixed by the Minister, who also takes care that they are properly executed.

REVENUES FROM GOVERNMENT FORESTS; COST OF MAINTAINING OR MANAGING FORESTS; PROFITS OF FOREST CULTIVATION.

The estimated revenue and expenditure of the state forests for the years 1886-87, according to official statement, are given as follows:

Gross receipts.....	M. 56,070,000
Ordinary expenses.....	31,062,200
Surplus.....	M. 25,007,800
Extraordinary expenses	2,450,000
Net income	M. 22,557,800

The following table shows the receipts and expenditures, and net income of the state forests from the year 1849 to the years 1881-82.

Years.	Gross receipts.	Expenditures.	Net income.	Years.	Gross receipts.	Expenditures.	Net income.
	<i>Marks.</i>	<i>Marks.</i>	<i>Marks.</i>		<i>Marks.</i>	<i>Marks.</i>	<i>Marks.</i>
1849.....	15,423,219	8,305,189	7,118,030	1866.....	30,058,873	13,106,425	16,952,448
1850.....	17,224,395	7,646,474	9,477,921	1867.....	28,708,478	14,159,298	14,549,180
1851.....	17,556,804	7,959,792	9,597,012	1868.....	43,396,195	23,297,524	20,098,671
1852.....	17,933,046	8,130,490	9,802,556	1869.....	45,059,989	24,556,451	20,503,538
1853.....	17,880,051	8,151,075	9,728,976	1870.....	43,555,574	22,850,027	20,705,547
1854.....	18,468,858	9,017,334	9,451,524	1871.....	43,177,274	22,671,227	20,506,047
1855.....	19,674,861	9,233,631	10,441,230	1872.....	50,191,662	24,993,002	25,198,660
1856.....	22,552,365	10,407,537	12,144,828	1873.....	55,161,328	26,016,329	29,144,999
1857.....	23,843,652	9,935,712	13,907,940	1874.....	56,385,220	28,910,471	27,474,749
1858.....	23,185,986	10,405,590	12,780,396	1875.....	59,505,812	30,084,412	29,421,400
1859.....	21,978,531	10,381,806	11,596,725	1876.....	61,547,707	31,975,894	29,571,813
1860.....	21,782,256	10,350,972	11,431,284	1877-1878.....	53,687,106	33,021,516	20,665,590
1861.....	24,768,166	11,508,843	13,279,323	1878-1879.....	51,161,468	32,002,802	19,158,666
1862.....	28,056,939	11,741,412	16,315,527	1879-1880.....	49,506,748	31,934,501	17,572,247
1863.....	29,567,004	12,457,977	17,109,027	1880-1881.....	53,799,874	31,232,366	22,567,508
1864.....	29,812,542	12,371,769	17,440,773	1881-1882.....	54,944,945	30,786,957	24,157,988
1865.....	32,109,414	12,621,390	19,488,024				

The quota of the different objects of income contributed to the gross receipts is as follows :

	1849	1855	1860	1865	1870	1875	1880-81
	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>
Wood.....	89.63	89.34	88.09	89.20	88.80	89.43	89.14
Miscellaneous.....	7.00	8.30	9.96	9.16	8.60	7.67	8.18
Game.....	0.57	0.42	0.59	0.45	0.67	0.53	0.64
Turf.....	0.88	1.02	0.82	0.72	0.56	0.79	0.63
Rafting.....	1.81	0.68	0.29	0.24	0.09	0.06	0.07
Pastures.....		0.13	0.13	0.14	0.10	0.17	0.18
Saw Mills.....					1.08	1.25	1.04
Nurseries.....					0.03	0.04	0.08
Zoological gardens.....		0.06	0.09	0.06	0.04	0.03	0.03
Forest academy.....		0.05	0.03	0.03	0.03	0.03	0.06
Total.....	100	100	100	100	100	100	100

FOREST PLANTING AND CULTURE.

The planting is done partly with nursery and partly with artificially grown seedlings, the former as a rule, in the case of foliage trees and the latter in the case of needle trees. (There are no well-known sellers of seeds in this consular district.) Both methods, however, are generally adopted in each case.

It is unnecessary to go into all the details of the different methods of planting since they depend too largely upon the condition of the climate, soil, and peculiar nature of the growth of the various kinds of trees. A close

study of these respective conditions is necessary in order to determine which is the most suitable method.

BOUNTIES.

The state grants bounties to those communes which undertake to cultivate at their own expense waste mountains within their district.

The maximum amount allowed is 36 marks (\$8.60), for each hectare successfully cultivated.

FOREST SCHOOLS.

In Prussia there exists three kinds of forest schools:

a. Two preparatory forest schools for *förster* and *forstschuttsbeamte*. The pupils, from 12 to 17 years of age, receive at these schools an elementary education and practical instruction in forestry under the direction of a *förster*. These schools are intended to take the place of the apprenticeship of two to three years which the student, on the completion of his elementary education elsewhere, would otherwise be obliged to serve at an *oberförsterei* under the direction of the *oberförster*. The advantage of the former is that it combines the elementary education with practical forest instruction.

b. Two forest academies, one at Eberswalde and the other at Minden, under the department of the Minister for Agriculture, Domain and Forest, and the immediate supervision of the *oberlandförstmeister*, one of the chief state forest officials in the Forest Department of the Ministry. These academies are intended to give a scientific education and to fit students for the forest administration service, that is to say, for the higher forest career, from *oberförster* upward.

The term of study is two years and embraces the following branches:

A. Fundamental Science.

1. Physics, including meteorology and mechanics.
2. Chemistry, organic and inorganic.
3. Mineralogy.
4. Geognosy and geology.
5. Botany.
 - a.* General botany.
 - b.* Anatomy, physiology and pathology of plants.
 - c.* Special forest botany.
 - d.* Anatomical and microscopical demonstration,
6. Zoölogy.
 - a.* General zoölogy.
 - b.* Special zoölogy, particularly with respect to the different kinds of forest animals and birds.
7. Mathematics.
 - a.* Repertory and practice in arithmetic, planimetry, trigonometry and stereometry.
 - b.* Principles of analytical geometry.
 - c.* Principles of higher analyses.
8. General political economy, particularly with respect to forest affairs.

B. Branch Sciences.

1. History and literature of forest affairs.
2. Forest statics.
3. Forest planting.
4. Forest preservation.
5. Forest technology.
6. Forest valuation, wood measuring, forest survey.
7. Forest statistics.
8. Forest administration, particularly with respect to the organization of forest affairs in Prussia.
9. Forest administration.
10. Redemption of forest claims.

C. Adjunct Sciences.

1. Jurisprudence, Prussian civil and penal code.
2. Forest road construction.
3. Game law.

As aids to study these academies have extensive collections relating to forest and natural science, botanical gardens, seed collections, &c. Each academy is under the direction of an *oberforstmeister*. The lectures are given by scientifically-educated foresters and special professors. The student, before he is admitted to these academies, must produce a diploma showing that he has passed the course of study required at a German gymnasium or at a Prussian technical school of the first class. He must be under 25 years of age, have a good character and show that he possesses the necessary means for studying.

DESTRUCTION OF FORESTS—CAUSES AND RESULTS.

The destruction of forests is caused mostly by parceling off large forest estates, which leads to a careless felling of the trees and little disposition to restore the loss.

An eminent authority on forestry science, Dr. Otto von Hagen, in writing on this subject makes the following observations:

“The forest is a trust handed down to us from past ages, whose value consists not alone in the income derived from wood, but also in the importance which it exerts, through its influence on climate and rainfall, on land culture. Its importance is not merely a question of the present day or of the present ownership, but is also a matter which concerns the future welfare of the people. This is a truism beyond contradiction, but nevertheless it is daily disregarded by those who are indolent and selfish.

“When such evils reach the stage of common danger, and this is in a great measure already the case, it then becomes a duty to interfere by legislation. Neither the decrease of the wood production nor the difficulty at times to meet the demand for wood, nor the rise in the price can confer upon the state the right to interfere with the freedom of private ownership or of private administration of forests. But this right and duty would devolve upon the state in case that any injury is done to the welfare and existence of the inhabitants of a certain locality resulting from the destruction of the forest.

How entire districts which flourished in the past have been reduced to poverty and want through forest destruction, has been seen in Prussia, where large tracts of lands have suffered under such calamities.

"By stripping the beaches of their forests in the seventeenth and eighteenth centuries, the sea-coasts have become exposed to all winds and storms. Fields, once fertile, have been transformed into waste sand dunes, and whole villages, whose agricultural people formerly prospered, have ceased to exist.

"In the middle and eastern provinces light and undulating soil has been replaced by small or large sand hills, and places where forests once stood and served to carry off stagnant moisture, have been turned into marshes. In the western mountainous provinces the fertile forest soil, the waste product of thousands of years of the trees, has disappeared. It has been dried up by the sun and wind, and washed into the valleys by rain and snow-water, and left the mountains bare and unfertile, whose soil is scarcely capable of supporting any vegetation save heath and broom-grass.

"The rich meadows in the valleys have vanished, they have been again and again, after every rain storm, washed and torn by the water rushing from the mountain tops. The high moors which have been formed by the destruction of the forest, emit at all times of the year vapors and fogs which kill vegetation far into the land. Thus the soil becomes directly impoverished, and the climatic conditions change and become worse. Instances of the injurious effect upon the culture of the soil caused by the destruction of the forests can be seen to a smaller or larger extent throughout Prussia."

RECLAMATION OF SAND DUNES AND WASTE PLACES.

The state spends annually considerable sums in restoring waste places in the interior, and more especially the sand dunes on the sea coast by planting the former in pine trees and the latter in grass, thereby protecting the coast belt against the violence of storms and facilitating forest cultivation in the interior.

SOURCES OF LUMBER SUPPLY, TRADE, IMPORT DUTIES, ETC.

By far the greater part of all the lumber used in Rhenish-Prussia and Westphalia, Hessen-Nassau, &c., comes from the Bavarian and Black forests.

Trade has been rather brisk during the last year, and large quantities of lumber have been used, but prices were, and are yet, low and profits small.

Considerable quantities of white wood (pine) are annually imported from Sweden and Russia in the form of battens, *i. e.* cut into logs of 2 to 3 inches thick, 5 to 7 inches wide, and 6 to 24 feet long, English measurement. These battens are used only for planing boards. The import duty on battens is 1 mark (say 23.8 cents) per 100 kilograms, or about 25 marks (say \$5.95) per standard of 125 cubic feet. I am informed that these battens must be imported, because South Germany cannot supply the necessary quantity of the desired lengths and dimensions. American wood is also pretty largely imported, and the demand for it is increasing annually.

The annexed table of the importation of lumber into Germany shows the amount imported from the United States during the last three years.

Pitch-pine is imported in the form of hewn and sawed timber and boards and deals, particularly boards and deals, and flooring for finer building purposes. A very large sawmill owner in this neighborhood informs me that American pitch-pine is much liked by builders on account of the good quality of the wood and the absence of large and unsound knots. Prime qualities only are bought here. He further states that shippers latterly have sent over a very much inferior quality than formerly contracted for. As the cargoes have to be paid for by acceptance against bill of lading buyers on this side become timid in making new contracts, and a considerable depression in the trade of pitch-pine might be the consequence if shippers do not hold themselves more to the qualities contracted for. As this American trade with Germany is evidently growing it may be well for me here to warn shippers against sending over qualities inferior to those contracted for.

The import duty on hewn timber is 25 *pfennige* (say 6 cents) per 100 kilograms, and on sawed timber, boards and deals, 1 mark (say 23 cents) per 100 kilograms.

American oak is also imported, but not to a large extent. The prices are too high against those of Bavarian and Westphalian oak. Oak bark, oak staves and oak lumber for doors, furniture and floors are imported from Austria.

Statement showing the amount, in tons, of timber, lumber and building wood imported into, and exported from the German customs territory, during the years 1884 and 1885, and for the 11 months ending November 30, 1886.

Countries.	1884.		1885.		11 months ending Nov. 30, 1886.	
	<i>Imports.</i>	<i>Exports.</i>	<i>Imports.</i>	<i>Exports.</i>	<i>Imports.</i>	<i>Exports.</i>
Parts of Empire not included in customs territory.....	77,635	76,766	82,604	92,699	37,324	61,313
Belgium.....	7,828	108,748	6,635	95,429	3,217	78,348
Denmark.....	491	5,136	1,462	4,499	404	3,818
France and Algiers.....	6,015	183,288	5,265	147,109	3,856	111,181
Great Britain.....	1,649	32,479	2,280	40,136	367	34,099
Italy.....	787	1,358	730	1,684	396	951
Holland.....	9,657	77,097	5,089	85,797	6,889	65,358
Sweden and Norway.....	236,706	1,493	311,694	1,020	158,900	811
Austria and Hungary.....	707,391	41,881	824,444	32,667	512,747	23,256
Portugal and Spain.....		251		28	28	336
Russia.....	862,686	4,438	1,395,390	2,647	805,653	2,532
Switzerland.....	8,395	60,996	18,628	39,437	5,457	37,302
All other European countries.....	5,519	442	6,768	449	849	591
United States.....	20,414	5	21,707	6	15,168	102
Total amount.....	1,945,173	594,308	2,424,696	543,503	1,550,355	419,998

WM. D. WAMER,
Consul.

UNITED STATES CONSULATE,
COLOGNE, February 3, 1887.

SAXONY.

REPORT OF CONSUL MASON, OF DRESDEN.

The kingdom of Saxony for a long period, as well as the people in their private enterprise, have paid great attention to forestry, and the traveler's eye is greeted often with its splendid forests and woods. Generally the land not adapted to profitable farming is devoted to plantations of trees.

AREAS OF FORESTS. (REPORT OF 1883.)

Species of wood.	Private.	Public.	Total.
	<i>Acres.</i>	<i>Acres.</i>	<i>Acres.</i>
1. Oak for barking.....	3,360	251	3,611
2. Willow plantations	1,486	25	1,511
3. Stock ausschlag (trees topped for the purpose of sending forth new branches from the stock) without upper trees.....	23,842	178	24,020
4. Stock ausschlag with upper trees	63,271	1,217	64,488
5. Other foliage trees :—			
a. Oak	4,775	3,432	8,207
b. Birch.....	21,135	795	21,930
c. Beech.....	14,540	9,558	24,098
6. Fir.....	220,279	94,375	314,654
7. Larch.....	2,333	328	2,661
8. Pine.....	244,543	300,177	544,720
Total.....	599,564	410,336	1,009,900

COMMON FORESTS AND PRIVILEGES.

	<i>Acres.</i>
Forests attached to villages, towns, etc.....	46,016
Forests attached to charitable institutions, by bequest.....	20,661
Forests held by companies or partnership.....	4,651
Forests owned by private individuals.....	528,197

The population have no privileges in the forests, but are permitted to collect and carry away dead branches, a permission which is given with a view to obviating as much as possible the inclination to stealing wood.

Pasturing in the forests is not permitted.

FOREST ADMINISTRATION.

The administration of the public forests is divided into 11 forest districts and 110 forest circuits, overlooked by an *oberforstmeister* (head steward of a forest).

The Ministry of Finance, by whom all forest officials are appointed, exercises the entire management and superintendence of all matters pertaining to government forests.

The business of every forest district is managed by an *oberforstmeister*, who is under the immediate orders and direction of the Ministry of Finance. All other officials of the district are subordinate to him. He superintends the execution of all orders of the bureaus, and the technical operations in

the government forest of his district. Likewise under the immediate command of the Ministry of Finance is the *forstrentbeamte* (treasurer of forest rent), who has charge of all the forest revenues and expenses of his district.

Every government forest district is commanded by an *oberförster* (head forester). These head men are the executive officers, who, aided by subordinate assistants and auxiliaries, exercise the office of managing the district intrusted to their care.

The *forsteinrichtungs director* (director of forest arrangements), also subordinate to the Ministry of Finance, commands, assisted by forest engineers, candidates and aspirants for the office of superintendent of forests, visits the forests with them, and gives practical outdoor instruction of all branches of forestry, from planting to harvesting the timber. He devises all plans for improvements in forestry, particularly their economical management.

FOREST REVENUES.

The last accounts exhibited:

Revenue from 429,600 acres of area and 799,000 forest-yards of hard wood, including \$5,000 revenue from the chase.....	\$2,740,000
For maintenance.....	\$551,000
For management.....	372,750
Total expense	923,750
Leaving a profit of.....	\$1,816,250

FOREST CULTURE.

The Saxon forests, in the mountains as well as in sandy low grounds, consist for the most part of pine and fir. Extensive forests of foliage trees, especially oak and beech, are found only in flat land.

As to culture, both planting and sowing are adopted. Planting, however, is most prevalent.

In planting the number of plants per acre depends upon the method used in setting; generally, however, 60 different plants (from 2 to 5 years old) are regarded as the proper number.

The following is the manner of planting:

1. Larch on dry ground, either in small bundles (2 or 3 pieces) or in clusters, the ground well worked and pulverized.

2. Planting in furrows in loose ground. The surface of the ground (of a required breadth) is removed in strips, and in this uncovered soil, at certain distances, furrows or grooves are made into which the plants are set equidistant from each other.

3. Planting on hills, in sod, covered or humid places, when necessary, with the liberal use of garden mold.

Sowing is done in furrows of 4 to 5 yards in breadth and 1 to 2 yards apart, in loose and fertile ground.

The seeds are placed in drills made in well-worked furrows. The furrows are in most instances hoed in the preceding autumn.

In sowing, which is done of both pure and mixed seed, 10 to 12 pounds of seed per acre are used.

Along with sowing wood seed or setting wood plants suitable patches of ground are portioned off for the cultivation of grain.

FOREST SCHOOLS.

Forest Academy of Tharandt. Besides this are committees of examination of candidates for appointments in the government forest service and committee for experiments in forestry.

1. For appointments as *förster* (forester), *oberförster* (head forester); or *oberforstmeister* (head steward of a forest, as well as for a professor in the institute, is required:

a. A healthy constitution and free from any defect, especially of the eyesight.

b. Certificate of passing examination at a public high school or an educational institute of equal rank.

c. A half year's (practical) preparatory education in a government forest district.

d. Completion of a course of instruction, comprising five terms, at the forest academy of Tharandt.

e. Having passed the last examination on leaving the academy a three years' supplementary study by the candidate in a government forest district, or the third or last year at the Institute for the Establishment and Cultivation of Forests.

f. Passing another examination, ascertaining the candidate's practical knowledge and qualification required for any post in forestry.

g. After this examination of the candidate he studies up to the time of his actual appointment in a government forest district or in the office of an *oberforstmeister* (head steward of a forest). He must have directed during several years the office of an *oberförster* (head forester), and obtain knowledge of diplomacy and political economy.

2. For the appointment as *unterförster* (underforester) is required:

a. He must be 15 years of age.

b. Healthy constitution, free from any defects, particularly his eyesight.

c. Possession of good intellectual capacities, and sufficient school education.

d. A three years' apprenticeship in a government forest district.

e. A five years' education as assistant.

f. Examination and continued study of his vocation up to the time of actual appointment.

DESTRUCTION OF FORESTS.

The causes of forest destruction are:

a. Insects.

b. Natural occurrences, such as snow-breaks, windfalls, &c.

c. Injudicious management; increase of the calamity caused by destructive beetles, and, in consequence thereof, forced sales of timber at under prices. Sudden changes from uniformity, warmth and humidity in temperature.

Where wood pasture is still permitted, it is advisable to fence the trees until they are so grown as to suffer little or none by cattle.

To that end the time of preservation from injury has been fixed :

For beech, 20 to 30 years.

For oak, 20 to 25 years.

For elm, white beech, maple, ash, pine, fir, larch, 15 to 20 years.

For birch, willow, alder, linden, aspen, 12 to 16 years.

The above applies to the cultivation of tall trees ; for underwood the time of protection is shorter.

Destruction of forests is caused only by wind and snow, which are often the occasion of a great deal of windfall and snow-break of timber. Particularly serious consequences, however, do not arise from them, except in cases of extraordinary breakage, occasioning a depression of the price of such timber. No other ravage occurs in Saxony.

Reclamation of sand dunes or waste places by tree planting is not practised.

Timber is chiefly imported from Austria (Bohemia, Galicia, Hungary). As to the quality of the imported timber, it ranks with the Saxon.

The duty chargeable: on timber simply worked with axe and saw is $2\frac{1}{2}$ cents per 100 pounds ; on one compact yard (festmeter) worked in the same manner, 30 cents.

SEED DEALERS.

Sellers of seeds and shoots are not found in Saxony. The government draws its supplies from Thuringia. The government districts, however, sell offshoots and seeds to private persons.

JOS. T. MASON,

Consul.

UNITED STATES CONSULATE,

DRESDEN, *February 23, 1887.*

DÜSSELDORF.

REPORT OF CONSUL PARTELLO.

The consular district of Düsseldorf, in which is included the agency at Essen, is located in the valley of the Rhine, in a level section of open country, abounding in small cities and villages, covered with manufacturing establishments of different kinds, with but here and there small patches of woodland or forest scattered through the district, the country having been cleared off, and if forests ever existed to any great extent, they have become a thing of the past.

It is, therefore, difficult to obtain statistics of a reliable nature, particularly on the subject of tree-planting or culture, and for that reason this report has been much delayed.

The section of country running from Coblenz south on the Rhine, and north and east of Barmen and Elberfeld, which are the neighboring consular districts, are well covered with forest trees, said districts being better located than this for the purpose of furnishing a full and reliable report upon the subject.

The Düsseldorf forest district, including always Essen, and in which are parts of Arenberg and Münster, is divided under the laws and regulations of Rhineland and Westphalia into two country circles (*land kreise*), and it becomes necessary, in order to cover the ground, to embrace in this report statistics relating to parts of those sections of country which border on this consulate and in which the area of forest is greater.

AREAS UNDER FORESTS.

District of government.	Areas of land.	Areas of forest.	Areas of land.	Areas of fiscal forests	Areas of land.	Areas of forest land.
	<i>Hectares.</i>	<i>Hectares.</i>	<i>Per cent.</i>	<i>Hectares.*</i>	<i>Per cent.</i>	<i>Per cent.</i>
Düsseldorf	546,709	100,370	18.4	15,975	2.9	15.9
Münster	724,904	132,826	18.3	2,100	0.29	1.6
Arensberg	769,690	322,157	41.8	18,953	2.4	5.8
Essen of Kuhr †	20,650	2,610	12.6			

*1 hectar = 10,000 square meters.

†All forests are private.

In the government district of Düsseldorf proper only about 2,550 hectares of forest belong to what is called the commonality, or in which the people have any rights recognized by law. All the rest, in which is embraced 81,875 hectares, is considered as private property and 15,975 belonging to the royalty, the pecuniary benefits the population before had, as stated in the law, are lost to the people.

RECAPITULATION :

	<i>Hectares.</i>
Private forests.....	81,845
Belonging to royalty.....	15,975
Belonging to commonality.....	2,550
Total	100,370

The rights of the people in what is called the common forest are confined to the ordinary use, without abuse of any kind.

The German people, being noted for their love of out of door exercise, frequent the woods in summer for all kinds of excursions and gatherings, and, weather permitting, at all seasons of the year persons may be met with walking through the public woods.

The public forests are only allowed to be used in a peaceful and quiet manner, under certain rules and regulations.

Watchmen are on duty to prevent damage to trees ; cutting of limbs and branches is forbidden ; no smoking allowed ; shooting of game of any kind prohibited. Pasture is not allowed in forests and animals found running loose are impounded.

Pecuniary benefits from the sale of wood, from hunting privileges or from any other source enure alone to the benefit of the government. The people are generally well aware of the law and appear to carefully respect the same.

ORGANIZATION AND FUNCTIONS OF GOVERNMENT FOREST BUREAUS.

Düsseldorf is the capital of a part of Rhein-Preussen, with a complete organization of government bureaus independent of city affairs, and embraced within this establishment is to be found a "forest bureau," with jurisdiction over the forest district of Düsseldorf alone, with organization and *personnel* about as follows: Oberforstmeister, forstmeister, forst inspector, oberforster forst assessor, fiscal forester, common forester, assistant forester.

The *oberforstmeister*, or chief ranger, has the supervision, inspection and management of the forests of his district.

The government forests of the entire district are divided into five *oberförstereien* of from 1,300 to 7,800 hectares area, each of which is managed by an *oberförster* (high forester); between the *oberforstmeister* and the high forester range the *forstmeister*, or ranger, and the forest inspector as assistants of the first.

All these officials must be graduates in all classes of what is called the gymnasium or school of the highest order, besides a practical service of one year under a chief forester in the various duties in the office, field and woods; and, further, a study of three years in a forest academy. After examination promotions are made, only after practical service, to the higher positions. These rules and regulations apply to forests belonging to certain titled heads, as well as the common forests, in which some rights of the people are recognized.

Each chief forestry is divided, for certain other purposes, into from 6 to 10 forest districts, which said subdistricts are managed by foresters who attend to the culture and care of the trees, and protection of the loose wood and game.

To obtain the position of forester young men of from 15 to 16 years of age must, after having graduated from the common school, go through a practical service of three years under a chief forester, this besides and in addition to the three years' military service compelled by the government, which, in this case, must be in a shooting or hunter's battalion. If the examination is passed, with good testimonials, the applicant can get a position as forester after a long service as assistant forester.

In addition to this there is a position of common *förster* of second grade, which places are usually filled by soldiers of hunting or shooting battalions, after a satisfactory service of about nine years; and if the examination of the first-named forester is not good, the applicant can only obtain a position in the second grade last-named.

The pay of the *oberforstmeister* is about 6,000 to 8,000 marks per year; the pay of an *oberförster* is from 2,000 to 3,300 marks, in accordance with

length of service, and in addition to this the last-named have certain allowances, such as use of the forest, wood free, location free, hunting privileges, and so on. The forest assessor, who has finished his studies and is an applicant for position of *oberförster*, has no fixed salary, but allowances for necessary expenses. The forester has a small annual salary and bounties.

The regulations now in force in regard to matters of this character is the law of the 15th February, 1879.

REVENUES FROM GOVERNMENT FORESTS.

According to the report of 1879-81 (the only available report), 65.5 cubic feet of wood, timber and fire-wood, are obtained on an average from each hectare of the common forests.

The revenue from the district for wood was reported as.....	M. 244,335.00
Other products of the forest.....	100,938.70
Of hunting grounds.....	2,517.50
Miscellaneous.....	9,578.00
Total.....	M. 357,369.20

Which amount divided up makes about 22.37 marks per hectare.

The expenses were estimated :

For foresters and their assistants.....	M. 22,410.00
For chief foresters and their assistants.....	25,347.00
For treasurers.....	6,969.00
For wood-cutters, &c.....	37,327.80
Diverse	34,546.20
Total.....	M. 126,600.00

Or at the rate of 7.92 marks per hectare.

The total revenues amounted to.....	M. 357,369.20
The total expenses amount to.....	126,600.00

Leaving a surplus of..... M. 230,769.20

Or at the rate of 14.44 marks per hectare.

The actual revenue and expenses in the year 1881 were as follows :

Revenues.

Regierungs bezirke.	Area of fiscal forests.	Area not used for wood culture.	Produce of wood in cubic ft. Rhenish.	Produce of wood per hectare.	Gross amount of receipts.	Amount of receipts per hectare.
	Hectares.	Hectares.	Kilog's.	Cubic ft.	Marks.	Marks.
Düsseldorf.....	15,975	1,300	1,068,495	61.2	365,643	20.00
Münster.....	2,100	388	183,900	76.9	56,511	24.30
Arnsberg.....	18,953	784	1,504,135	76.5	328,503	16.70

Expenses.

Regierungs- bezirke.	Salaries.	Wood cutting.	Culture and buildings.	Diverse.	Total.	Net amount of rev- enue.	Net amount of rev- enue per hectare.	Amount of expenses per hectare.
	Marks.	Marks.	Marks.	Marks.	Marks.	Marks.	Marks.	Marks.
Düsseldorf	62,481	37,329	23,820	25,137	148,767	216,876	14.7	8.5
Münster	11,013	4,125	3,010	4,635	22,788	33,723	14.0	10.2
Arnsberg	85,728	41,214	34,110	10,344	171,396	157,107	8.0	8.8

FOREST PLANTING.

About 70 per cent. of the forest is growing trees, or what is here called leaf-wood. The age in which the wood is chopped is: for oaks, 150 to 180 years; for beech, 100 to 120 years; for trees with pointed leaves (for pine, Scotch fir or birch), 30 to 100 years, the last-named being often chopped within 30 or 40 years, because it is then fit for certain purposes in connection with mining interests, building shafts, &c. Beech is not planted much, because it is not considered as excellent for firewood or timber.

The planting and growth in former times was by the act of nature; of late years by shoots or small plants that are raised in nursery gardens and carefully transplanted at the proper season of the year and nursed and cared for until the growth is well started. In each forest district one or two of the nursery gardens are maintained in excellent condition.

A peculiar method of wood culture is used in what is called the "Rheinwardens." These are the lands which are formed by alluvial deposits in certain points on the banks of the Rhine. As soon as the deposit is so high that the water does not cover it at all times, the land is covered with willow stubs; these grow very fast, sand and earth deposits are formed readily between them, and the land soon reaches that height that the water overflows it seldom. The patches of land thus reclaimed become excellent pasture or meadow land, and the willow trees valuable, the cuttings finding ready sale for basket and other twisted woodwork.

DESTRUCTION OF FOREST—CAUSES AND RESULTS.

As the district of Düsseldorf is extensively populated, all products of rural economy are very much in demand.

Owing to the growth of the iron and other industries, which are scattered at short distances throughout the district and the demand for suitable territory, a great portion of the private forests have been devastated and made into arable land. In consequence of that the humidity of the earth diminishes and the land itself gets more sterile; besides that, the useful birds, losing their shelter and places for nests, decrease; insects multiply, and, consequently, the grain fields are seriously damaged thereby. It is, of course,

well known that the less forest the less rainfall, and sections of country without reasonable areas of forest lands are subject to long and serious drouths.

SOURCES OF LUMBER SUPPLY.

As the district does not raise or produce the lumber to meet its wants a considerable import of timber and lumber takes place, especially from the Upper Rhine and Bavaria, also from Norway and Sweden and from the United States. Düsseldorf and Duisburg are the chief places of import for lumber of all kinds.

Within the last few years the customs duties on lumber importations have been about as follows, viz.:

	Per 100 kilograms.	Per fest-meter.
	Marks.	Marks.
For stockwood with all bark.....	0.10	0.60
For stockwood roughly worked out on the ends.....	0.20	1.20
For stockwood roughly worked out on both sides and ends.....	0.40	2.40
For timber, lumber, boards, and planks.....	1.00	6.00

SELLERS OF SEEDS AND SHOOTS.

There are at this place the following persons engaged in the business who are considered reliable, viz.: G. Struch & Co., Düsseldorf, Concordiastrasse; Otten & Co., Düsseldorf, Bolkerstrasse; C. Caasmann & Sohn, Oststrasse; and in Essen the following: Carl Arends, Kettwigerchaussé 51; Hermann Becker, Bahnhofstrasse 102; Karl Böhnert, Kettwigerstrasse 3a.

The existing laws in force in this district are the same as those within the district of the consulate-general at Berlin. They are made by the royal government at Berlin for the several forest districts.

D. J. PARTELLO,

Consul.

UNITED STATES CONSULATE,

DÜSSELDORF, *April 26, 1887.*

DUSSELDORF, GERMANY,

OFFICE OF PRESIDENT OF RHEIN, PRUSSIA, *February 23, 1887.*

Sir: I beg to reply to your letter of the 18th instant in regard to forest matters, that the royal government at this place would not be able to give you a sufficient answer to the questions made by you, because this portion of the government district belongs to that part of the Prussian monarchy in which the least number of forests are to be found; moreover, the greater part of the questions are of so general a nature that to answer them in accordance with the situation of this small portion of the monarchy would produce a false idea.

I recommend you, however, sir, to apply to the "Royal Ministerium for Agriculture, Domains and Forests" in Berlin. But if you should like to have any information about (specially) just the portions of forests situated here, which I consider would not be very interesting, we would be willing to demand of the royal government that the desired information be given you.

Yours, faithfully.

BERLEPSH,

Regierungs President

HAMBURG.*REPORT OF CONSUL LANG.*

The state of Hamburg comprises 1,453.4 hectares of forest land; 952.9 hectares of this territory belong to the state, 55.7 to separate parishes, 9.1 to societies, and 435.7 to private individuals.

The parish forests are very insignificant. In the state forests the poorer classes are permitted to gather brushwood, &c.

The management of the state forests is subordinate to the Board of Finance. An officer possessing technical knowledge is at the head, and has five officials under him.

Receipts about.....	M. 24,000
Working expenses.....	11,000
Cost of management.....	9,000

The forests are in excellent condition.

Plants for cultivation are raised in nursery gardens. Renovations are principally made by planting plants from one to eight years old, according to the kind of wood and the character of the soil. Premiums are not paid, and schools of forestry do not exist.

The forests are very seldom destroyed—occasionally, perhaps, by game and insects. Everything possible is done to prevent this.

In Ritzebüttel and Geesthacht about 415 hectares of sand dunes and waste places are being planted with trees.

The state forests are not able to fill the demand of the Hamburg wood trade, consequently this business is a very lively one.

The principal seed dealers are Peter Smith & Co., Ernst and von Spreckelsen, and Otto Wiebalck; and the growers of plants are Peter Smith & Co., James Booth and Carlson.

No special forest laws exist; they are embodied in the general laws of the Empire.

WM. W. LANG,
Consul.

UNITED STATES CONSULATE,
HAMBURG, *April 14, 1887.*

MANNHEIM.*REPORT OF CONSUL MONAGHAN.***FOREST AREA OF BADEN.**

The area of the Grand Duchy of Baden is 1,508,113 hectares. Of these the following may be classed as wood and forest land:

Woods and forests under official forest control —

	Hectares.
State forests.....	95,025.24
Town forests.....	249,021.58
Corporation forests.....	18,289.76
Total	358,336.58

Stands and grundherrenwälder ; that is forests owned by nobles or landlords :

	Hectares.
Landlords, &c	59,099.17
Other private persons	121,548.24
Total.....	180,648.01

FOREST REGULATIONS.

All woods and forests in the Grand Duchy are carefully and thoroughly supervised and inspected. No part must remain uncultivated. All unnecessary paths, ways, &c., must be filled in and planted. No kind of freedom in the woods or forests is allowed to the people. In private woods the cultivation of the same is allowed to the owner, but the owner is bound, under the law, to observe the statutes, even in his own woods, relating to the cutting, preparing, or carrying away of wood from the forest by night ; also the statutes relating to the sale of wood. He is also bound by law to have his woods measured and surveyed, marked with stones for boundary lines, and a full description of the same made. Private owners are further forbidden to cut down their forests wholly ; to destroy or endanger them without the permission of the highest authorities to do so. Any manner of treatment or cultivation contrary to the statutes, or by which the forest may be injured, will not be allowed even to private owners.

Owners of private woods and forests are compelled by law to so cultivate their forests that they will never fall below a certain standard. Should the owner fail, either by entire neglect or by careless cultivation, then the state foresters will step in and take the forests from the hands of their owners and place them both, forests and men, under proper treatment. In these forests pasturage is also permitted, yet the cattle must not be driven to pasture before sunrise nor allowed to remain after sunset. Further, the trees in *hochwälder*, that is woods where the trees grow from seeds, and do not grow up again where stumps have been left for a second or third growth, the leaf trees must have attained an age of 35 years, and needle-bearing trees must have attained 30 years. In *niederwälder*, or woods which spring up from stumps, the hardwood trees must have attained 25 years ; ash, alder, birch, and soft woods in general, 12 years before cattle will be allowed to pasture among them. The pasturing of sheep and goats, because of their destroying propensities, is forbidden. In the state, town and corporation forests the pasturage is allowed only to parties possessing rights thereto secured by law, and these parties are bound to a full observance of all the statutes and regulations relating to the same.

THE CARE OF THE TREES.

In spring, about the month of April, the seeds are sown in the "seed school" in beds, arranged in rows which are about three or four inches (10

centimeters) apart. The young shoots remain in these beds two years, and are then transplanted to the "plant school" and arranged regularly in beds. From these beds they are taken at the age of from four to six years, depending upon the kind of tree, and planted in the woods or forests. When the wood has attained a safe growth the soft wood, thornwood, &c., are cut away and the whole wood cleared of underbrush. This manipulation of the forest will be repeated every four years, and continued until the young trees have gained the ascendancy, as it were, over all the other roots, in the woods. Then the trees are allowed to grow to full maturity without much further special care, and at the age of from 80 to 150 years, or when well developed, the trees are cut down and assigned and prepared for the various uses and purposes of life.

ORGANIZATION AND FUNCTIONS OF THE FOREST BUREAUS.

In the Bundesstaaten, or in each of the United States of Germany, the state government has control of the organization of its forest bureau and government. In the Grand Duchy of Baden the control of the woods and forests is centered in what is known as the "domänen direction." The jurisdiction of this bureau or body extends, (1) over all the state forests, farms and building; (2) over all taxes, liens, &c., on forests; it must decide as to the competency of "liens and rights" to build made out in favor of churches, schools, &c.; (3) it must exercise control over the cultivation of the town and corporation forests, and direct and control every new experiment made in relation to cultivating the forests; (4) it must also control the entire forest and mountain police system. The Ministry of Finance has control, in the name of the state, over the forests in all respects except over the forest and mountain police system, which is under the direction and control of the Ministry of the Interior.

The domain direction finds local representation through district foresters and certain appointed subordinate representatives; the care of all governmental buildings are under the direct care of the district inspectors of buildings. The district foresters have the management and cultivation of the state forests to care for, the oversight of town and corporation forests in the matter of cultivation, and in all woods and forests over the police system, and all judicial actions brought before the courts relating to the woods or forests, the carrying out of punishment in all such cases. For this purpose the state and district attorneys will render them assistance. At present there are 2,423 wood guards on duty.

The domain *verwaltung* is an administrative body which attends specially to the cultivation of the forests. The "Kameral-domänen and Bezirks Kasse" is a finance department which has charge of all money matters relating to the forests.

INCOME FROM GOVERNMENT FORESTS.

I gather the following from the statistics issued by the grand ducal government in 1884. The income may be stated as follows :

For wood.....	M. 4,091,200
Forest products, nuts, &c.....	235,056
Fines, &c.....	4,067
Fees for privilege of hunting.....	26,793
Other rights, &c	2,352
All miscellaneous income.....	2,032
Total	M. 4,361,500

Expenses :

For keeping district and town roads.....	M. 114,277
Turnpike roads.....	81,009
Wood given to parties having claims	7,315
Wood given out of good will.....	4,615
Forest products given to parties with "rights".....	45,339
Products given out of good will	14,319
Miscellaneous gifts.....	1,728
Pay to wood guard	191,489
For making and keeping boundaries.....	5,085
For making road for carrying out wood.....	250,498
For cultivating the forests	136,127
For the preparation of wood and forest products.....	746,566
For measuring and valuing the same	13,522
Miscellaneous	3,997
Total	M. 1,615,885

Recapitulation.

Total income.....	M. 4,361,500
Total expenses	1,615,885
Leaving a net gain for the year 1884 of.....	M. 2,745,615

The profit or benefit to a country from the building and care of woods and forests is twofold, that is, there is direct and indirect profit. The indirect is to be measured (1) by the broad influence exercised by woods and forests over the warmth or temperature of the air; (2) in the mighty power they exert in breaking the force of strong, and many times destructive, winds; (3) in the manifold blessings derived from their influence in increasing the moisture of the air and thereby increased amount of rain to help cultivation; (4) the principal profit is to be found in the influence wielded by woods and forests in increasing the fruitfulness of a country. The woods and forests draw from the air millions of tons of carbonic acid. In the mysterious alembics or laboratories of nature acids, valuable to all animal life, are prepared and scattered abroad with a bounteous hand; their sweet exhalations purify and sweeten the air, making it healthy and strengthening for man. The direct value or profit to be derived from building and caring for forests consists of a vast number of indispensable articles of daily use and in the means afforded by woods and forests for a hundred industries giving employment to hundreds of thousands of poor but industrious people.

FOREST PLANTING, CULTURE, ETC.

The first part of your question will not admit of any details just here, whatever I may be able to do later. Volumes have been written, for the most part filled with local words and technical terms, making the work of translating very difficult. Years of study in technical schools and years of practice in the woods afterward are necessary to fit a man for the position of forester, and not every forester, as I found in my interviews with several of them, would be able to write anything like a decent book or article on forest culture. Permit me here to give the names of some of the best works, with the assurance that I shall do what I can later to answer that part of your question more in detail: "Sowing and Planting," Burchard; "Wood Culture," Gweinaer; "The Science of Forestry," Fischbach.

The culture of the forest is done either by means of seeds or plants. The methods of conducting the sowing and planting are manifold. The above-named works contain elaborate and detailed instructions for each and every kind of seed and plant.

FOREST SCHOOLS.

The state gives no bounties for helping on the culture other than the generous support it gives to schools, and the encouragement given by its systematic and effective protection. In each of the separate states of the German Empire one finds forest academies existing, either independent or attached to some university. In Baden the forestry academy is joined to the technical high school at Karlsruhe, the capital city of Baden. Any person seeking a position as forester or forest official will have to submit proofs of his having made preparatory and special study for the position. The preparatory study will be the general preparatory course through the public schools and in a course, theoretical, namely through the branches of mathematics, science, and especially natural science, an acquaintance with which is necessary.

The special course must consist, in the theoretical, of the exact knowledge of all branches of the science of forestry; in the practical application of the principles of the science of forestry, wood cultivation, and service in the administration of the forest department. The general preparation may be more clearly defined as follows: If a man has studied the various branches taught in a high school or has passed through a first-class real gymnasium, corresponding to a good scientific course in an average American college, he may be said to be well prepared to enter upon his special course. The special course embraces universal or general arithmetic, algebra, geometry, practical geometry, with plain drawing, plain and spherical trigonometry and polygonometry, elementary mechanics, zoölogy, botany, mineralogy, geology, physics, chemistry, agricultural chemistry, a knowledge of soils and climatology. It will thus be seen that a very thorough preparation is required before a man is allowed to experiment on such valuable material as the woods and forests. Add to the above the theoretical study of forest statics, forest statistics, knowledge of how to administer the forests, history of forests, and

forest literature, knowledge of hunting, laws relating to same, etc., natural history of wood and forest culture and of forest trees, the uses of the forests, their benefits, etc., and their technology, methods for laying and building roads, paths, and waterways, analytical geometry, differential and integral calculus, forest management, valuation, appraising, forest care, forest police system, forest and hunting rights, and the general scope of the civil laws, national or political economy, the science of finance, general land and forest culture, agriculture, culture of plants and meadow culture. The lectures on these subjects may be heard at a technical high school, or in any other school or academy adapted specially for this purpose. The course of such lectures extends over three years as a rule. Two things contribute to the Germans obtaining the vast amount of useful, theoretical, practical, mechanical, chemical, and scientific knowledge: his indomitable patience and his devotion to whatever profession he chooses in life.

DESTRUCTION OF FORESTS.

To my questions upon this subject there was a peculiar unanimity in the expression of opinions. In every well regulated state, said almost every forester with whom I conferred, which exercises a supervisory control over its forests and woods, and which looks after the welfare of its people, the health of its inhabitants, the preservation of a thorough and beneficial influence of the moisture of the atmosphere upon the agricultural industries, &c., no destruction or devastation of forests occur. At times when hurricanes come, fires occur, or insects come in swarms, or other accidental cases occur, entirely or partially dangerous to the forests, they are of such a local nature that they may be easily dealt with. Of course, the danger will be measured by the completeness, more or less, of the control over the forest and wood areas. In cases, however, where, as often happens in France, Spain, and Italy, the state forests are sold to private parties, the town woods and forests are subject to mere caprice or arbitrariness. The private woods and forests are, so to say, free from rule, regulation, or restriction, and calamities the most frightful and dreadful sometimes occur: the springs dry up, the rains cease to fall upon the dry, parched earth (moisture of the atmosphere being no longer attracted by the presence of trees), or if they do come, come down with such a rush that floods and general destruction of property, oftentimes accompanied with loss of life, occur; the climate becomes poisoned for both man and beast, and vegetation suffers terribly, if it does not disappear, as it often does, entirely; the people grow poor in pocket, lose much of their æsthetic feeling, their mental, spiritual, and bodily life suffer, disease, even pestilence, follow, and where once were green fields, purling streams, babbling brooks, grazing cattle, happy, busy, prosperous, contented people, under the shadows of health-exhaling pines, grand old oaks, or fruitful beeches, one sees ruin, death and desolation. Just at the moment of writing dispatches are bringing to the different newspapers reports of terrible losses by landslides in the Black Forest (*Schwarzwald*), the Baden Highlands, and

the Tyrol Hills of great tracts of mountain land covered with trees. The thinness of the soil on the mountains and the great weight of the recent unprecedented snowstorms are the causes of these landslides.

RECLAMATION OF SAND DUNES.

It is a fundamental principal in Baden that no inch of soil shall remain waste or useless ; when not suited to agricultural purposes it must be planted with trees. Although such is the ruling principal in Baden, the year 1884 shows the following number of square hectares of waste land converted into forests : State, 122.68 ; towns, 79.60 ; corporations, 11.23 ; landlords, &c., 4.42 ; other private parties, 61 ; total, 278.93 hectares. Some of this territory was reclaimed from sand wastes.

METHODS OF CULTIVATING AND PLANTING.

In reclaiming such places seed is seldom if ever used ; plants a year or more old are selected for the purpose. Before any planting is done, however, the soil must be prepared for the young trees. This preparation sometimes consists of a mere scratching up of the surface or by plowing and weeding out of weeds, and even a few years may be given to planting vegetables. The soil is sometimes prepared all at once or in patches here and there. We must make a difference in the sand places. There are the sand wastes along the seacoast and those in the interior. To give the sand dunes a "bindung," cohesiveness to fit them for wood and forest purposes, a beginning is made by planting *sandhofer* or sand oats, *arundo arenaria*, a kind of reed grass, or sand reed, *elymus arenarius*. Just as soon as the soil shows sufficient cohesive properties so that no longer doubt exists as to its fitness to grow trees, young shoots are selected and planted.

In beds of *flugsand*, quick or drift sand in the interior, the seeds mentioned above may be sown or *pfriemen*, broom or feather grass (*spartium scoparium*) may be planted. The whole surface will be so arranged that small fences or shelter hedges will be run across the surface and arranged in such away as to meet and break the force of the winds, facing, of course, that direction from which the most dangerous winds usually blow ; then behind these little fences young Scotch firs a year or so old may be planted. These young trees must be planted very deep in order that the roots may set or sink deep.

In Hungary also young shoots from the Canadian poplar are used. These young shoots are laid in rows across the sand waste in such a way as to break the force of the winds ; the young shoots are also put in obliquely with the lower parts against the wind. It is always a great advantage if trees can be planted on the windy side years before the sand wastes are taken under care for reclamation ; the results are, of course, much safer and quicker.

SOURCES OF LUMBER SUPPLY.

The principal source of Germany's lumber supply is Thuringia, Baden, and the Black Forest country. Lumber is also imported from Austria, Hungary, Slavonia and America. The traffic in lumber is lively and yet varied. In

times of peace good prices are obtained; in times of war, when almost all building is suspended, the prices fall terribly. No bounties, allowances, premiums, &c., are granted to importers or to any persons for importing. Since Germany, and Baden especially, is rich in wood and timber and lumber forests, instead of bounties being granted import duties are charged, both for lumber and other woods.

Logs, with or without bark	{ per 100 kilograms... M.	0.20
	{ per cubic meter.....	1.20
Cut into planks, &c.....	{ per 100 kilograms...	0.40
	{ per cubic meter.....	2.40
Timber from boxwood, cedar, cocoa, ebony, mahogany	{ per 100 kilograms...	0.10
	{ per cubic meter.....	0.60
Long wood, boards, &c	{ per 100 kilograms...	1.00
	{ per cubic meter.....	6.00
Cedar boards	per 100 kilograms...	0.25

SEED AND PLANT DEALERS.

Piazola & Fokrath, Hohenheim, Baden, Germany; J. M. Link, Mudau, Odenwald, Baden, Germany; J. G. Steingässer, Miltenburg-on-the-Main, Germany; Keller, Darmstadt, Hessen, Germany; Appel, Darmstadt, Hessen, Germany.

Since every village in Baden has a plant school and, as in the forests, care is always taken to keep the necessary supply on hand, it is hard to give the names of parties having young trees for sale; though I have no doubt know that arrangements might be made with the forest authorities to purchase trees if necessary.

J. C. MONAGHAN.

Consul.

UNITED STATES CONSULATE,

MANNHEIM, *January 7, 1887.*

FORESTRY LAWS OF THE GRAND DUCHY OF BADEN, EMPIRE OF GERMANY.

Enacted A. D. 1833. Published January 14, 1834.

LEOPOLD, BY GOD'S GRACE, GRAND DUKE OF BADEN, DUKE OF ZÄHRINGEN.

CONCERNING FOREST POLICE, ETC.

SECTION 1. The administration of the forest police department shall accord in every case with the definitions of the present laws.

Those officials appointed to the care of forests, &c., by landlords, village governments, town authorities, or corporations are subject and must be subject to the officials appointed by the state.

SEC. 2. Only persons shall be appointed as forest officials who have passed a successful examination under the state officials, and have been declared competent in the science of forestry.

Forest officials appointed by landlords, town authorities, or corporations must be approved by the state.

All forest officials are in duty bound to be sworn by the state officials before they enter upon their duties; and officials of the same grade possess equal power.

SEC. 3. No person can become a forest official who has not attained the age of twenty-one years.

SEC. 4. A person serving in the forest administration is debarred from holding any other office. Yet, with the agreement of the person having the appointing power, the state officials can make exceptions to the last preceding paragraph.

SEC. 5. All forest officials and the entire forest service are forbidden to sell wood, or any other product of the forest, or to engage in any business in which wood or forest products is the chief article of business, or to take part in any such business. Only with the agreement of the state authorities and those having the appointing power to service in forest work can the privilege be obtained to buy wood, to graze cattle, to sell grass, or to cultivate the land.

SEC. 6. The person possessing the right to services of forest officials must bear the expenses connected with such officers' work.

The towns and corporations must pay a definite tax to the state, and a stipulated sum to the foresters, when their forests have been directly cared for by forest officials appointed either by the landlords or state. Also the following allowances:

1. For the usual offices—
 - a. For checking off fire-wood of more than 20 cords, or for checking off log-wood, 300 cubic feet.
 - b. For the counting of wood intended for burning, and for measuring log-wood.
 - c. For gathering acorns. A price may be settled upon for allowing the use of the acorns to herders of swine, or for gathering the seeds.
 - d. For indicating what trees are to be felled in leaf woods, pasture woods and districts where the people are allowed to gather the chips and fall wood. For fencing in of places being treated or cultivated.
 - e. For general care of the forests according to approved methods of culture.
2. For exceptional labor (*i. e.*).
 - a. For reports on boundaries.
 - b. For declaring values of woods, and for dividing woods into parts and also for bounties for exemption from service.
 - c. For local inspection, in cases where a change of cultivation is intended.
 - d. For personal inspection, where destructive natural forces, or other destructive agencies, are at work.

For the exceptional labors classified under number 2 the master forester is allowed all fees and privileges allowed by statute.

SEC. 7. For the purpose of marking trees, the trees both in inclosures and open woods, the forester carries a wood-axe. The owner of the wood is allowed to have a control badge or sign. A copy of both the wood-axe and the control badge are to be deposited in the competent district office, and, also, one must be left at the forest office.

SEC. 8. The forest officers direct the cultivation of the woods and forests. They also indicate what woods and forests may be used for various purposes; and control, in general, the direction of supervising the forest police force. This they also do in regard to private forest domains only so far as the present laws allow. In case their orders are not fully executed, or in case contest over the meaning of the laws arise, then the forest officials shall appeal to the courts after first having acquainted the state appointed forest authorities.

Trees of the various kinds not arranged in woods or forests do not come under control of the forest laws.

THE CULTIVATION OF THE FORESTS IN GENERAL.

SEC. 9. The forests are to be so cultivated that by the cutting down and removal of old large trees without loss of time a young forest can take their place.

(*Kahle Abtriebe.*) The entire clearing of a wood or forest cannot, except for special reasons and then only with the consent of the state officials, be allowed.

SEC. 10. For the purpose of keeping the forests young, in accordance with natural laws, the following ages must be allowed to the various trees:

1. (*In hochwaldungen*). In highland forests: oak, 120 years; beech, 70 years; red and white fir, 70 years; for Scotch fir, 70 years; 2. (*In niederwaldungen*). In lowland forests: hard wood trees, 25 years; soft wood trees, 15 years; for tanning and timber wood, 12 years. In forests of mixed woods the felling will be governed by the period of years prescribed for the trees which prevail most. That is in a forest where the ratios are 5 pine; 7 birch, and 12 oak trees, the cutting will take place at the time assigned for cutting oak; and in cases where a doubt exists the limit of hard wood shall be taken as the limit.

SEC. 11. In the highland forests the trees must be so trained that the outermost branches of one tree will almost meet those of another, and shall also be kept in such a manner as to allow the entire woodland to be covered with seed. In the case of leaf-bearing trees and needle-bearing trees, with the exception of white fir, small openings will be permitted for light.

SEC. 12. When, under the protecting shade of the larger trees, a growth of young trees appears the large trees can be cut away after the little ones have attained the height of from 3 to 5 inches; but all the large trees shall not be cut down at once, but shall be cut down at two or three periods; but red fir and Scotch fir will be allowed to be cut down in the first period. The young growth must, from time to time, even until the wood is ready for felling, be thinned out, and especially must the trees of stunted growth be rooted out.

SEC. 13. In the forests of low growing trees enough of the best old trees are to be spared and kept for seed purposes.

SEC. 14. In hoed, in rent (where only a few trees stand) and forests, where bark for tanning is gathered, an exception to the foregoing can be made.

SEC. 15. The wood, with the exception of timber wood, must not be cut, except in the time between the beginning of September and the end of April.

SEC. 16. In cutting the oldest trees and those most fully developed are to be cut first. In mountainous districts the cutting must begin above and the trees must be so felled, row upon row, that it will not be necessary to drag them through places planted with young trees.

SEC. 17. Traveling through places planted with young trees is not allowed. If, however, in such a place trees needed for a special use, and not to be found elsewhere, are found they can be cut down.

SEC. 18. In the making of a clearing, especially in woods of needle-bearing trees, the cutting must be towards the west, as far as this is possible, in order that no harm come to the trees from the inblowing winds. If this cannot be done a certain number of trees must be left on the west side as a mantle against the sharp winds.

SEC. 19. In felling trees where they are not rooted out they must be cut as near to the ground as possible, when cut with an axe the stump left must not be over 5 inches high, and when cut down with a saw not over 8 inches. Wood under 4 inches thick may be cut down with the axe, wood over 4 inches must be sawed.

SEC. 20. The cutting must be done in such a manner as to cause as little injury as possible to young growths or neighboring trees. In low-growing trees the cuttings must be made with very sharp axes, since the splitting of the shoots is not allowed. Trees that are felled in places where seed have been sown must be removed at once after being felled.

SEC. 21. For brooms for stables, for strips for binding bundles, &c.; for pea and bean-poles, the young trees can be cut down only when they are misformed or remain stunted. Willows must not be cut for any such purposes.

SEC. 22. The tearing off of limbs from the trees is strictly forbidden, yet dry and withered limbs may be broken away by the hand, but in no case must they be cut away by tools.

Regular days for the gathering of the offal wood, &c., must be appointed by the owners and forest officers. The districts in which the wood may be gathered must also be given.

SEC. 23. The cutting, carpentering or manipulating of the timber wood in a forest where

young trees are growing is strictly forbidden. Such timber can only be so much prepared as is necessary to secure its safe transportation.

SEC. 24. The rooting out and cutting of stumps is allowed, only where no young growth is again expected. Wherever a stump has been dug out the ground must be levelled up.

SEC. 25. Wherever a young growth of trees is found and wood must be piled up in its neighborhood, it must be so packed and piled as to do as little harm as possible to the young growth.

SEC. 26. The carrying away of the wood by drags is forbidden except over snow, or in places where other methods are not possible.

SEC. 27. Cutting, chopping, and all other kinds of work on wood products in the forests by night is forbidden.

SEC. 28. The clearings must be made within the time from September to April, inclusive. If the clearing is to be made in the mountain heights, among swamps, or in timber land, it is not possible to bring it all out before the 1st of May, then the forester can make an allowance of time; but for a continuance of the privilege from year to year application must be made to the state authorities.

SEC. 29. No part of the forest must be left barren. All unnecessary paths, ways and gullies must be filled up and planted.

SEC. 30. Cord-wood for burning must be piled 6 feet high, 6 feet wide and 6 feet long.

Wood 4 inches thick, or thicker, must be split, all less than 4 inches in diameter will be left round.

If the wood is made up into bundles, then must these bundles be 4 feet long and 1 foot thick. Because of the difference of measures in different parts of the land the forest officials can allow the privilege of making up the cords and bundles to meet the export trade. Those persons having the right to cut wood will receive the same quantities as before, but it must be measured in accordance with the new measure.

SEC. 31. Every wood and forest within five years after the enactment of these laws must be measured, staked with boundary marks, have the boundary defined and described, and must be so marked for cutting that when the last in a series of cuttings is finished the first of the series shall be ripe to begin the series of cuttings again. For the purpose of registering the measures, limits of boundary and estimates for each cutting, expenses shall be paid from the department of forestry, and copies of the boundaries shall be deposited at the bureau of forestry. A new survey will not be necessary where land has once been surveyed and plans of the same have been deposited, and the old measures can be exactly reduced to the new legal measure. Should the owner of a forest fail to have survey, definition of boundaries made within the specified years, by giving good reasons why it could not be done, an extension of time may be granted.

CONCERNING THE USES OF THE FORESTS FOR GRAZING, ETC.

SEC. 32. In forests of high trees the places planted must not be used for grazing places only after the young trees have attained the ages: *a.* Leaf-bearing trees, 33 years; *b.* Needle-bearing trees, 30 years.

In forests of low trees: *a.* Under hardwood trees, not before the trees are 25 years old; *b.* Under ash, alder, birch, and softwoods generally, not before they have attained the age of 12 years.

In forests of mixed trees the time will be governed either by the period assigned to that kind of tree which most prevails, or in case of doubt the period will be marked by the number of years assigned to hardwood.

SEC. 33. The grazing of cattle will be allowed only between May and October, inclusive. The grazing of cattle in general ceases so soon as cattle are turned into the forests to fatten for the market.

SEC. 34. Before sunrise and after sunset pasturing of cattle in the forests is not allowed. Only in cases where it would be too far to drive the cattle home are they to be allowed to remain in the forests, and then only in sheds or inclosures.

SEC. 35. The necessary paths through the forests to the meadows or springs will be indicated by the foresters when they do not already exist.

SEC. 36. The pasturing of sheep and goats in the forests is not allowed; though in village districts, with the consent of both owner and forest officials, an exception to this rule may be made.

SEC. 37. Each animal pasturing in the forests, except sheep, must wear a bell.

SEC. 38. Each town and village is in duty bound to appoint one or more shepherds to watch the flocks. No villager must, either of himself or through an appointed shepherd, drive his flocks apart from the common flocks, they must all feed together. When a village has no pasture right, but certain parties do possess it, these parties in common are required to appoint a shepherd.

SEC. 39. Only those parts of the forest that have passed the periods of years indicated in paragraph 32 will be used for grass or grazing purposes.

SEC. 40. The gathering of green leaves from the trees for the purposes of fodder is forbidden. In times when the pasturage fails the forester, with the consent of the owner of the forest, can make exceptions to the above rules.

SEC. 41. Gathering of leaves, moss or needles will be allowed in woods of high trees, only after leaf-bearing trees have obtained an age of 40 years, and needle-bearing trees an age of 30 years. And in woods of low trees only after the hardwood has obtained 15 years, and softwood 12 years, nor can these be gathered only up to within 3 years of the time appointed for felling the trees. No leaves, needles or moss shall be gathered for 3 years before the trees are felled.

SEC. 42. Certain districts where the soil is scant and poor, or where the trees grow on steep sides, exposed to the sun, &c., must not be opened to the public for the gathering of leaves, moss or needles.

SEC. 43. The gathering of leaves, moss, &c., will be allowed only on days appointed by the forest officials, acting in conjunction with the forest owners. Nor must the leaves be raked up with any other rakes than wooden rakes. Except with the consent of the forest officials leaves shall not be gathered in the same forest two years in succession.

SEC. 44. For the purpose of gathering acorns and beech-nuts, to feed the swine, only those oak and beech trees must be used which are not needed for seed purposes. Upon the entrance of a year in which the gathering of nuts is allowed, must the forest owners and those possessing the right to gather, notify the forest officials.

SEC. 45. Only on fixed and stated days, appointed by the forest officials, by and with the consent of the forest owners, will the gathering of nuts, acorns, &c., be allowed.

The leaves raked together when gathering the nuts or acorns, must be scattered again, immediately after the nuts are picked up. The knocking of acorns from the trees is not allowed.

SEC. 46. The gathering of the acorns or the feeding of the swine in the woods will not be allowed longer than three months.

Four weeks before the time of permitting the swine into the woods the forest officials will cause notices to be posted up in the different villages to that effect, and these notices will signify in what districts entrance is allowed.

SEC. 47. The forest officials will determine in accordance with the bearing capacity of the trees how many swine may be allowed in a forest.

SEC. 48. Those parties having the right to send their hogs into the forests are bound to see that they are cared for by a swine herd or shepherd (*hirten*). The swine must be branded, each village or party having their particular brand, copies of the brand must be deposited at the forest bureau.

SEC. 49. The gathering of pitch is allowed only in forests that are 50 years old. The foresters will mark the trees reserved for seed; from said trees no pitch must be removed. The forester shall also indicate to owners, or those having the right to gather pitch, what trees they may tap and how many taps or openings they may make on each tree. Said privilege to make taps must be regulated by the strength of the tree.

SEC. 50. A forest district must be tapped for pitch only each time after the lapse of two years. Because of peculiar circumstances the forest officials can make an exception to the above rule, and can allow the pitch to be gathered every year. The cutting of the taps must not be made before the middle of June and the gathering must be concluded before the middle of September.

SEC. 51. The districts for digging out pine roots and the length of time during which the digging may be carried on, is to be specified by the forest officials, and to be so specified that the trees do not suffer harm. The person allowed to dig out such roots is in duty bound to fill up the holes again.

SEC. 52. The gathering of woodberries in places planted with young trees, or in places where plants are treated, can be forbidden by the officials until the trees are five years old.

SEC. 53. If bees are to be set out in the woods the forest officials must indicate what place is adapted for the purpose.

SEC. 54. The hunting for mushrooms must not be carried on in places where young trees are growing, but in forests where the trees are very large and no young trees are growing.

SEC. 55. By quarries or gravel and sandbanks, as well as by turf-beds, the place to make an opening where least harm can come to the forest is to be indicated by the forest officials, they will also indicate the road by which the stuff will be drawn away, also the spots where it may be piled up, also the places where the refuse matter may be piled.

SEC. 56. By digging in the forests the trees are to be cared for as much as possible. Those persons who wish to do digging in the forests must inform the officials of their purpose and get information from them as to where digging is allowed. All holes made by digging must be levelled off again.

SEC. 57. No dwelling house or building, except those built for forest purposes, must be built within 400 feet of the forest.

The repairing or extension of a house already built is allowed.

A limit of distance within which a house must not be built can be assigned on other grounds than those relating to forestry.

SEC. 58. The above paragraph 57 does not affect buildings belonging to a village, nor does it affect private, isolated woods of less than 100 acres.

SEC. 59. An exception to paragraph 57 can only be made by the forest officials, by and with the consent of the state authorities and parties owning forest land within 400 feet of the building desired to be erected. If such privilege is accorded it must be understood, when not specified, that no woodenware manufactory and no building for carrying on business in wood will be allowed.

MEASURES FOR PREVENTING FIRE.

SEC. 60. The places where charcoal may be made in the forests must be assigned by the forest authorities. The coal pits must be 15 paces from the ends of the nearest tree boughs, and for a distance of 4 paces from the burning pile all combustible materials must be removed. A pace in this, as in every case where a doubt may be found to exist, is to be regarded as two and a half feet (*schuh*).

SEC. 61. The charcoal maker is in duty bound to notify the forester, or forest overseer, of the time when he starts his fires. After the fire is once started the charcoal-maker must not leave his pit by day nor by night; besides, he is in duty bound to have a sufficient quantity of water on hand to prevent accident by fire.

SEC. 62. In windy or stormy weather the charcoal burner is in duty bound to erect something to break and keep off the wind, and during the prevalence of such weather he must not remove the cover from his pit nor draw out coal. Coal must not be taken from the pits through the forest before 24 hours have elapsed after it has been drawn from the pit.

SEC. 63. The same rules must be observed in preparing ashes as are prescribed for the making of charcoal.

SEC. 64. No fire must be kindled in a forest, nor within — feet of the same, nor near a turf-pit lying near by without especial privilege from the forester who, when such permission is given, must see that all necessary measures of safety are taken.

SEC. 65. As exceptions to the rule laid down in 64 are, the fires for the shepherds, wood-choppers, quarrymen, &c., and these must be kindled in places as remote as possible from danger to the forests.

Also fires used for burning out roots, stumps, &c., when the woodland is being prepared for culture. In all cases must the fires be ten paces from the forest and at least four paces from large trees, and the ground lying between the fire and the wood and trees must be dug or broken up.

The kindling of a running fire in the woods is forbidden; only in special cases can it be allowed by the forest authorities, with the approval of the mayor.

SEC. 66. Shepherds, wood-choppers, quarrymen, &c., are in duty bound to extinguish their fires before they quit the forests.

SEC. 67. No place for preparing tar, or for preparing lime (lime kiln), will be allowed within 15 feet of the edge of a forest or woods.

SEC. 68. Special ordinances will be found further on to indicate what shall be done in case of fires breaking out in the forests.

RULES IN RELATION TO THE ANNIHILATION OF INSECTS.

SEC. 69. As soon as destructive insects are known to have entered a forest the officials are in duty bound to take measures without delay looking to the destruction of such insects. In necessary or special cases the tree or trees must be felled, drawn at once out of the woods, or stripped of limbs, bark, leaves, &c., the same must be piled together under wood moss and burned.

SEC. 70. The catching of titmouse and other forest birds, with the exception of those coming under the list of those allowed for hunters to shoot, is forbidden. It is also forbidden to disturb the birds' nest.

DISPENSATION FROM RULES OF THE FOREST POLICE DEPARTMENT.

SEC. 71. From the preceding rules of the forest police department can the state, with the consent of the forest authorities, provided that the forest owners make no opposition, make dispensation especially in cases where exception to the general rule is necessary on account of special circumstances in the interest of the forest culture or of the owner; or if agriculture or industry renders it urgently necessary. Special instructions in regard to the necessity which prompts to an application for a free dispensation must in every case be submitted.

CONCERNING WOODS OWNED BY THE STATE.

SEC. 72. The clearing out or chopping down of trees to such an extent as to go beyond leaving the necessary reserved number is not allowed unless permission has been first obtained from the chief forest authorities.

RULES CONCERNING FORESTS BELONGING TO VILLAGES.

SEC. 73. The yearly agricultural and culture plan of the villages will be prepared by the forester and town counsel together; the forest authorities must then examine it and indorse it and see that it is carried out.

SEC. 74. The yearly supply of wood of all kinds needed by the village, either for immediate use or for sale, must be reported to the forest authorities, in writing, after having notified those having rights to draw wood from the forest to send in a statement of the amount needed for the year by each; this must be examined, and in August, at the latest, approved and so

regulated that the reserve supply demanded by law shall not be broken in upon. Especial requests for the privilege of cutting down wood will be entertained only in cases of great necessity.

SEC. 75. As soon as the approval of the clearing and agricultural plan has been obtained the forester will receive the notices for wood, &c., without delay, such notices being receivable until the end of October. He will also take the notices of those intending to cut. The trees to be cut down must be marked by the forester's hammer, and must be marked in two places, one about the height of a man, so as to be easily seen, the other near the ground and just below where the cutting must be done, so that the mark will remain upon the stump even after the tree has been felled.

SEC. 76. When the wood is prepared it will be taken possession of by the forester, who will count or measure it, enter it upon a list under various headings which contain the different prices, and the same must be handed over to the town council. Timber-wood, wood to burn, and logs for the saw-mills must be again marked by the forester's hammer, and without such marking in no case taken from the forest.

SEC. 77. Wood to be sold on the tree must, before the sale, be marked and valued by the forester.

SEC. 78. The forester will leave to the town council and village officers the task of setting values in their wood for sale, but when the wood is put up at auction the forester must be informed as to the whole transaction, of which he will take notes, so far as the rules of the forest police department may imply that notice should be taken. After an auction the protocol is to be sent to the forester, who will acknowledge thereon that such and such a quantity of wood was directed and allowed to be sold, and must make a record of the same and authenticate the protocol.

SEC. 79. The wood must not be divided among villagers from standing trees, but must be divided openly after it is all gathered.

SEC. 80. Wood for building purposes, after it has been cut down and arranged, must be measured and delivered by the cubic foot. No such wood will be sold standing.

SEC. 81. In districts where the demand for vine-props is unavoidable and where the woods are on steep hillsides, and the wood cannot without great difficulty be carried out, it is permitted to cut down, trim and measure; then must the logs together with boughs be piled in separate piles and divided among the citizens. Ninety cubic feet shall be regarded as a cord.

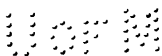
SEC. 82. The privilege of dividing the wood while the trees stand is allowed only by a two-thirds vote of the villagers, and under the following conditions: (a) That all those possessing the right to gather wood will fell their trees at the same time and bring it away under the supervision of the officials; (b) provided that the entire number, or a sufficient part of those having the right to cut and take away wood, will pledge themselves to make good any trespass done, to pay for any and all trees cut down which have not been marked for cutting, to pay for the loss of any seed-tree cut down where young trees are growing; (c) and provided that in forests of high trees the measuring of the trunks and the cording of the wood for burning is done by the forester before the wood is carted away.

SEC. 83. The forester is in duty bound to give the town councils notice of all notices received of intentions to cut wood, &c., of receiving and measuring wood in regard to cultivating the same, and the town councils reserve the right to appoint parties to represent them and work with the forest officials.

SEC. 84. The entire clearing of a forest or any unusual cutting down of wood must be first approved by the state officials before the village authorities proceed.

CONCERNING RULES RELATING TO CORPORATION FORESTS.

SEC. 85. The forests belonging to corporations must be treated in the same manner under the forest rules expressed in sections 73, 74, 75, 76, 77, 78, 80, 83, 84, with the exception that instead of the village officials, representatives of the corporations must act in conjunction with the forest authorities.



RULES RELATING TO WOODS OWNED BY LANDLORDS.

SEC. 86. The forests and woods owned by landlords and private gentlemen must be treated as other private forests. The care and watching over the same will be regulated according to measures laid down in sections 87-93, and under control of the state forest police force.

RULES RELATING TO PRIVATE FORESTS.

SEC. 87. Private owners shall have freedom to conduct the cultivation of their forests, and no movement shall be made against them by the forest authorities for violation of the forest laws only in the following cases:

SEC. 88. Private owners are bound to observe the law, as laid down in section 31, relating to removing stones, defining boundaries, and surveying the forests; also as laid down in sections 27 and 34, regarding work in the forests at night; sections 60 and 68, in regard to protection against fire; section 69, regarding measures for destroying the insects; section 70, so far as this paragraph treats of the catching of the titmouse, &c. The private owner is absolutely bound by the preceding, and for the violation of any of the said laws he (the private owner) is as liable to punishment as any other person who violates them. Paragraph 30 is to be applied to private owners of forests in so far as the wood is intended for sale, &c., and in relation to an agreed measure with the parties having a right to a division.

SEC. 89. The destruction or out-rooting of a forest is not allowed, unless the private owner has received permission from the state authorities to do so; nor must such permission ever be refused a private owner without giving him a full statement why the refusal is made. No great change in forest cultivation will be allowed without the consent of the state forest officials. If the cultivation of forest land threatens injury to the forest or the destruction of the same, when the owner has cultivated without first having received permission from the state to enter upon cultivation, the forest officials can, in accordance with section 178, forbid the continuance of the cultivation. In so far as the forest has already been injured or destroyed, must it be restored again under and in accordance with the directions of the forest officials. If the private owner does not comply with the demands of the forest officials of his district within the time allowed, the state officials may grant an extension of time, with the provision that in case of failure on the part of the private owner to comply with the demands the work will be undertaken and carried out to full completion by the forest officials and the costs, &c., will be charged to the said private owner.

When the private forest owner allows this extension of time to pass without performing the necessary work to restore the forest, he will be confronted by an estimate made by the forest authorities, which estimate he will be compelled to cover, and the work will then be carried out under the direction of the forest authorities. The preceding rule, however, is not applicable to woods or forests of less than 25 acres, if such woods or forests are separated from others.

SEC. 90. If a private owner clears out a wood of less than 50 acres and leaves it bare for longer than one year, the district authorities, upon solicitation of the forest authorities, will request said owner either to replant the said soil with trees or to cultivate it within six months. Should the private owner fail to comply, then the law as laid down in the preceding paragraph shall be put in operation against him.

SEC. 91. In cases where the cultivating of a private forest endangers the rights or interests of some third party such third party will call in the service of a judge, and the forest authorities, in such cases, shall not interfere until requested to do so by the court.

SEC. 92. Also possessors of inherited forests, forests rented or bequeathed, are allowed the free use of their forests under the foregoing reservations and provisions, so far as they do not conflict with other statutes. Woods or forests over which some doubt exists, because of the recent death of the party last having right to the same, will be regarded and treated by the forest authorities with regard to the real, actual ownership as state, town or private.

SEC. 93. Woods or forests in which state, town, corporation and private rights are vested will be cared for by the state and regarded as state forests under the laws and regulations.

RULES RELATING TO FOREST STANDING ALONG THE BANKS OF THE RIVERS.

SEC. 94. All woods, trees, bushes, &c., growing between the edge of a river and the high bank or dam, also all such wood or islands in the rivers, with the exception of large trees can be cut down and used by the river officials, provided that no softwood trees over 5 year old and no hardwood trees over 10 years old are taken, and in cases of need such woods and bushes under 5 and 10 years respectively may be cut down and used by the river officials, no matter who the real owner may chance to be.

SEC. 95. In case the real owner of such bushwood or trees along the banks of a river wishes to cut down such wood himself he must give notice of such desire to the river officials and obtain from them the privilege to do so. Notice must be given four weeks in advance. If the request is not answered before the expiration of the four weeks, then is the owner allowed to proceed with his cutting.

SEC. 96. Excepted from the foregoing is the cutting of willow for basket-making and garden purposes, or bushes of young trees which the owner may need to cut down to use in building dams, etc. Such cutting need not be announced to the forest officials.

SEC. 97. In the cases alluded to in sections 94 and 95 the dams, etc., will be made by the employés of the river direction and under the supervision of the owner of the land and forest and river directors.

SEC. 98. Within three months after the cutting, or in the case noted in section 95, three months after notice, payments of indemnity are made out of the river department in accordance with the tariffs laid down in section 158; said tariffs to be regulated in the presence of the owner of the forest and the river authorities.

SEC. 99. The permission to change the culture or to make an entire clearing of bushwood, referred to in section 94, must be obtained from the bureau of water and streets.

CONCERNING FOREST RIGHTS—GENERAL STATUTES.

SEC. 100. The laws of the forest department help others, who have rights in forests, to enjoy the privileges of their rights.

SEC. 101. While in state, town and corporation forests, for the protection of the departmental interests, the state forest officials must be called in; in private rights, in case of differences arising, the forest owner takes the place of a forest official until such time as the question becomes one for the forest authorities to decide, then, as laid down in section 3, the forest authorities, with the knowledge of the head officials, will render decision.

SEC. 102. In cases where certain rights are bequeathed or granted and, then, by enactment of laws are curtailed or abridged, the person possessing said rights can make a claim for indemnity upon the forest owner, and when not granted can have the same allowed by applying to the court.

SEC. 103. If the wood or forest belongs to a private owner and he is not willing to pay out an indemnity, he is allowed the privilege of extending privileges on his estate to the party possessing rights that will make an equivalent for any losses sustained.

SEC. 104. New forest rights cannot be granted after the proclamation of these laws. The law will protect those which rest upon some special right or otherwise righteous practice, in so far as they were not granted in any way contrary to the law, as laid down in sections 134 to 136.

SEC. 105. In so far as the right is in no way limited by the forest laws the right may be enjoyed in its full scope, and in cases where no definite statement of the right is laid down it must be regulated in accordance with sections 106 to 133, and in accordance with the laws prescribed by the courts of the land. The rights of those parties who possess the right to use the woods and forests rest finally upon the decrees of the laws of the land; yet one possessing full rights is just as much bound by the rules prescribed in section 101 as a person possessing the simplest right or privilege.

RULES CONCERNING SINGLE RIGHTS TO THE WOOD.

SEC. 106. A person possessing the right to take wood must give notice to the forester before he takes any away; and in case of private forests the owner must be notified. The counting and measuring of the wood must take place and be recorded before it is carted or carried away.

SEC. 107. In cases where the right and title to the wood expresses a definite right it must be carried out in accordance with such definition and in no other way. In cases where no definite measure is laid down in the right, then the person will be allowed enough for his household uses and purposes and no more. The forest owner can demand, where no definite amount has been specified, that a definite amount to hold good for all time be specified.

In cases, however, where a definite amount is specified in the right the amount drawn and cut must never go beyond such a point as will encroach upon the reserve necessary for the perpetration of the forest. With the provision, however, that the person possessing a right and being curtailed in its enjoyment by the owner infringing upon the reserves can make claims for indemnity and have them allowed.

SEC. 108. Wood for building purposes, drawn by any person having a right to the same, must be used within two years after it has been taken from the forest. If it has not been used the forest owner can not only take it back, but can also make claim for any and all damages that may have resulted to the wood during the two years. Upon application, however, to the forest authorities an extension of time, in no case more than six months, may be granted.

SEC. 109. In case no particular district is indicated in a right, from which the person may draw his wood, then must he take it from any and all parts where wood is being cut or cleared in cultivating and caring for the forest.

SEC. 110. Where a right does not define the kind of wood a person must have, then must he take the wood as it is cut from old or young forests, taking his share of the wood as it runs, small and large, although he can make other agreement with the owner if said owner will agree.

SEC. 111. In case a certain kind of wood is defined in a right, then must that kind of wood be delivered so long as the specified wood can be found in the forest where he has his right. If, however, the owner of the forest has so decreased the size of his forest that it can no longer yield the kind specified, then can the possessor of the right make claim either for an indemnity in money or the stipulated worth in some other kind of wood from some other part of the forest, which, according to the forest laws, may be given.

SEC. 112. A forest owner has a right to demand a statement, certified to by a master-builder or master-carpenter, of how much wood for building purposes a person, possessing a right to the same, needs. The amount be specified in cubic feet.

SEC. 113. When wagon-makers have rights to wood to be used in their business and make demands for the same, the forest owner can demand a written statement, certified to by the town council, when it is pole wood, and by some person well acquainted with the kinds and amounts needed of other wood.

SEC. 114. The forest owner can demand that, for special objects only, the kind of wood suited to such object be delivered.

SEC. 115. In cases where the right is not otherwise defined, the right to building wood and wood for burning is understood, and under the right to building wood, cut wood and wood prepared for fencing, for building stagings or for making pumps is not included under the right.

SEC. 116. A person having the right to small bough wood only must not exercise his right to take the same before the trees are felled, the trunks trimmed and cut into length and the wood for burning piled up into cords; then he may begin to gather. The cutting off of green or withered boughs to a certain height is only allowed when it is specified in the right.

SEC. 117. As wind-fall wood must be regarded as trees (single trees), blown down by the wind and not those blown over but having their roots still fast in the earth, nor even boughs

which, although injured, still cling fast to their place on the tree, nor is the trunk of a fallen tree to be treated as wind-fall wood. Under wind-fall trees are understood those which, in falling, are torn out by the roots.

SEC. 118. The right to wood found lying in a forest extends over dead trees which have fallen themselves, with large or small trunks, and over such trees as, after having been removed from an inclosure where young trees are planted, still lie in the forest.

SEC. 119. By "refuse wood" (*Roff* and *Lesholz*) one is to understand small deadwood, which lies on the ground or may be reached on the tree from the ground by the hand, but must not be removed with tools. "Refuse" wood does not cover deadwood over 5 inches thick, nor (*Lager*) thick-lying wood, nor yet that expressed under the term "wind-fall wood." A person having the right to "refuse" wood must not take away more wood than is needed for his own purposes.

SEC. 120. The right to stumps and roots is limited to that part of the tree which remains after the tree has been cut down and taken away. The person having the right to stumps and roots is allowed to use such tools as are required to dig out the roots and stumps.

CONCERNING FOREST RIGHTS.

SEC. 121. The forester and in private forests the owner has the right to indicate what days and what times or seasons of the year the persons having pasture rights, &c., in the forests may exercise the same. The person possessing the right to pasture in the forest is allowed only to pasture his own cattle, those belonging to his farm, and in no way those held or bought for selling purposes.

SEC. 122. The person possessing pasture rights has to care for the troughs, the springs, the buildings for the cattle, &c. The owner is bound to bear part of the expenses when he uses the pasturage also for his own cattle.

SEC. 123. A person having a right to pasturage cannot transfer such right to another. The right to pasturage does not comprehend a right to grass; that is, if a man does not put animals out to pasture he has no right to cut grass or gather grass in any way, thinking thereby to get an equivalent for his abstinence from use of the pasture.

SEC. 124. In cases where a definite number of cattle are indicated in a "right," a young suckling with its mother counts as one, so long as the young animal sucks.

CONCERNING RIGHTS TO LEAVES AND STRAW.

SEC. 125. The right to leaves and straw carries with it the right to gather fallen leaves, moss, and pine-needles.

CONCERNING THE RIGHT TO ACORNS, NUTS, ETC., TO MAST OR PANNAGE.

SEC. 126. A person having the right to drive swine into the forest to feed on nuts, acorns, &c., can only send those necessary for his own household uses and raised by himself, nor can he transfer his right to another. A person having such right cannot demand money from the owner in cases where he does not drive swine into the forest or in any other way use his right.

SEC. 127. The owner of the forest himself is not excluded from driving his own swine into the forest.

In cases where both owner and parties having right to use the forest drive their cattle together in the forest and in consequence the acorns and nuts do not prove sufficient for the number of hogs, then the persons having rights to the use of the forest and the owner will have a right to drive in only such a number as there are acorns and nuts for, and the owner and parties having rights will drive in only so many each as may be their share, based upon the ratio of the household wants of each person, taking the wants of the owner as the standard. The owner is allowed to transfer or sell his right in case he does not drive in any swine of his own.

SEC. 128. A person having a right to the nuts and acorns for his swine cannot change that into some other right, nor will he be allowed to gather up and take away the nuts and acorns.

SEC. 129. A person having the right to gather acorns and bechnuts in strange forests can gather the same after the fattening time is over or almost over, gathering only so much, however, as he needs for his own uses.

CONCERNING RIGHTS TO GATHER PITCH OR MAKE TAR.

SEC. 130. The right to gather pitch or to make tar in strange forests arranges itself simply in accordance with the right as laid down in the title to right.

CONCERNING THE RIGHT TO GATHER MUSHROOMS.

SEC. 131. A person having the right to gather mushrooms is allowed to gather them at any and all times, and is allowed the privilege of one or more dogs to help in finding them (section 54).

PERSONS HAVING RIGHT OF WAY, ETC.

SEC. 132. Any one having the right to the use of acorns, bechnuts, grass, leaves, straw, to the gathering of pitch, &c., has the right of way to the places where such are to be gathered.

Persons having right to use of the woods, right to drive swine, or to drive cattle to water, possess also the right of way.

SEC. 133. The footpaths shall be 3 feet wide, and the drive ways, exclusive of the gutters, must be from 12 to 15 feet according to circumstances, and the branches must be cut away to 12 feet from the ground. The cattle ways shall be from 16 to 20 feet wide.

CONCERNING A CHANGE OF, OR GIVING UP OF A RIGHT TO USE TO, A FOREST, ETC.

SEC. 134. An owner of a forest can remove the burden of "rights" from his land by asking a person having such right to give up the same and accept a part of the property in exchange, provided the party accepts and the transfer is legally made. The part of the woods granted to the person having a "right" must not, unless said person is willing to accept such, consist of different pieces separated from each other; and as far as possible the piece of forest awarded to the person having a right must be sufficient to guarantee the person accepting it and giving up his right to as much wood, &c., as he formerly enjoyed. The decision of such cases, where an agreement cannot be arrived at, may be made by the courts.

SEC. 135. A forest owner can also demand of persons having right to pasture, to leaves, to straw, to mast, to fatten cattle, to gather nuts, &c., to gather pitch, make tar, gather mushrooms, to give up such right, &c., except in such cases where the maintenance of life of a person having a right would not be endangered or essentially injured.

SEC. 136. If the changes spoken of or referred to in the last preceding paragraph are allowed at the department of state all further arrangements of the matter are to be made in the courts.

CONCERNING FOREST TRESPASS AND PUNISHMENT IN GENERAL.

SEC. 137. The punishments for forest trespass, the taking away unlawfully of forest products, the harming, injuring of trees, &c., or any violations of the forest laws will be as follows:

a. Money fines which cannot be paid nor obtained can be changed into labor or public works, and in case no occasion offers for such can then be changed into imprisonment. *b.* Into punishment in the workhouse or house of correction.

The punishment shall never be less than 15 kreutzers (11 cents) equivalent to a half day's public labor, even when, in accordance with the ordinance, a smaller fine or punishment would be necessary.

A fine of 30 kreutzers (22 cents) can be changed into one day's labor on the public works or imprisonment. A fine or a part of a fine from 10 to 30 kreutzers (8 to 22 cents) or a half

day's labor on the public works; less than 10 kreutzers will not count, and over 30 will be classed at one day's labor on the public works.

SEC. 139. Public work embraces all ordinary labor that can be performed under the eyes of the public, namely, work in the forests, on the rivers, brooks, dams, mines, quarries, streets, and open ways of all kinds, bridges, gutters and crosswalks. The treasury department belonging to the forest department can direct the business of the fines directly or in union with others and draw in the money paid.

When the cashier of the forest court has not time to see that the punishment decreed by the court is carried out, then can the judge determine where the work shall be performed, &c.

The judge will always take care, when possible, to direct that the work be performed for the village, corporation or other forest owner in whose forest or wood the trespass has been committed.

A certain amount of work can be assigned to a certain number of days, and when, by continued application to his task, a person condemned to labor performs the work in less days than the number assigned, he may be, he must be set at liberty.

SEC. 140. No one shall be made to perform work at a distance so far from his home that more than three hours will be required to walk there, not even when work fails in his own district and he is compelled to labor in a neighboring district.

SEC. 141. The superintendence of the punishment will be carried out by the same one appointed by the forest authorities and the expenses of the same will be borne by the forest treasury.

The prisoner, laboring at public labor, receives for his food, at the expense of the state, 1½ pounds of bread per day. The public labor must be performed within the regular hours of general labor, an allowance of time being given for the prisoner to go to and from his home.

SEC. 142. If the person condemned to labor fails to appear or works lazily his punishment can be changed immediately into imprisonment, and in cases where the prisoner shows stubbornness the court can add from one to eight days.

SEC. 143. Foreigners, who trespass, will not be allowed to have public labor, nor a citizen who is over 65 years old unless they prefer public labor to imprisonment.

No man must be punished when the district physician declares him physically unfit to bear it. The appointment of a substitute to bear the punishment is not allowed except in cases where the fine cannot be paid and public work or imprisonment is substituted a husband can take the place of his wife or a full-grown young man can take the place of his widowed mother.

SEC. 144. Trespass which, according to the preceding paragraph, cannot be changed into public work must be punished by imprisonment, as must all sentences where the money cannot be paid and no occasion offers for public work.

SEC. 145. The punishment in prison can be sharpened by hunger or solitary confinement in darkness. Solitary confinement in the darkness shall never last more than 48 hours and shall not be repeated until 48 hours have passed before each period of confinement. Punishment on bread and water, or on bread and thin soup, shall be practised only every other day. One day of solitary confinement is equivalent to four days, and one day on bread and water to two days' simple imprisonment.

SEC. 146. No matter how high the fine for a single or a series of trespasses may be the change to prison punishment, or to labor on the public works, can never exceed two months. In case the amount of the fine would call for a longer punishment than two months, imprisonment may be sharpened as prescribed in paragraph 145. Then again a sentence of less than two months' imprisonment can be lessened by sharpened punishment, upon the request of the prisoner.

SEC. 147. In cases where one or more persons combine and carry out an act of trespass each shall suffer in himself the same punishment as if he had committed the trespass alone. Increased punishment because of more incriminating circumstances affect each person inas-

much as all the incriminating circumstances affect said person or as they operated through him in carrying out the act of trespass.

SEC. 148. Those persons possessing "rights" are liable to precisely the same punishment as other parties when they trespass the regulations of the forest laws.

SEC. 149. The following are to be regarded as aggravating circumstances:

a. The relapse one or more times in a year to trespass, or the practice of thievery in the woods after having been punished before the courts for either.

b. A trespass before sunrise or after sunset, or on trespass days (days when the forest authorities have meeting, &c.,) or on Sundays and holidays.

c. The perpetration of a trespass or thievery through a wood-chopper, a wood-piler, a charcoal-burner, a pitch-burner, or such other person employed in the forest.

d. The carrying of weapons when trespassing.

e. The disguising of the person when about to commit a trespass.

f. A refusal of the trespasser to give his name or residence or the giving of false ones.

g. The refusal to cease from following wounded animals or the refusal to leave such when found with them, refusal to leave weapons, implements, &c.

h. The refusal to follow the forest officer when declared by such to be under arrest. Libelling, threatening, or actual hindering of an officer in the performance of his duties will not come before the trespass court, but shall be punished in the general courts after the manner prescribed for the punishment of such offenses when practiced against any public officer.

SEC. 150. The existence or presence of any of the aggravating circumstances mentioned under paragraphs *a*, *b*, *c* and *d* gives the judge the right to double the ordinary punishment fixed by law. Concerning those enumerated as aggravating circumstances under *e*, *f*, *g* and *h* the increase of the ordinary punishment must not be more than one-quarter increased, and in no case more than 5 gulden (\$3.75), or an equivalent labor or imprisonment punishment.

SEC. 151. Children can only be imprisoned except in the cases where, according to paragraph 170, the parents are made answerable, and children shall only receive one-half the ordinary punishment prescribed by law for children under 14 years. No aggravating circumstances and paragraph 147 shall in no way affect a sentence on children under 14 years, nor shall such child be punished in any case longer than eight days. The parents of a child put in jail have the privilege of sending some one to stay near the child during the time of punishment.

There shall be absolutely no punishment of children under 7 years.

SEC. 152. The costs of trials must be borne by the treasury of the forest department.

When in cases of appeal from a decision of the trespass court persons are adjudged guilty such persons must then bear all the costs.

SEC. 153. In a sentence in which the court declares punishment, must be included the indemnity to the forest owner, said owner reserving still, however, the right to seek damages in the common courts.

In case the trespass court does not allow him large enough indemnity he can still appeal to the common courts, and should these grant him more the punishment pronounced against the trespasser by the trespass court remains as pronounced.

SEC. 154. The following are liable to arrest for fines, injuries, and costs:

a. A husband for the trespass of his wife, if she is living with him.

b. The father, and he being dead the mother, for the trespass of a son not of age, or of any children not of age.

c. The guardian, in regard to a trespass of the person over whom he is guardian, and in general all persons who have the care of children can be held answerable for the children's trespass.

d. Persons employing servants can be made to answer for trespass of the servants, whom they keep in their employ and who reside with them.

e. Teachers and trade masters can be held responsible for the trespass of the pupils or apprentices who are placed under their charge.

f. Employers may be made answerable for the trespass of persons in their employ when the trespass is done during or by means of an occasion in which the workman has been commissioned to do something for his employer. All the foregoing under the condition that they be exempt upon submitting proof that they could not have hindered the trespass, excepting as provided in sections 170 and 174.

SEC. 155. It belongs to the civil courts to pass upon the liability to arrest of the persons enumerated in the preceding paragraph.

Only if said persons are fined, according to section 171, for deception, cheating, &c., then must the civil judge decide how far said persons are answerable for a fine, to repair injury and pay the costs.

SEC. 156. The arrest for trespass must take place within a year after the trespass has been committed, reserving, however, to the person damaged the right to sue for damages at any time before the civil courts.

A case for trespass falls through if in three years the case cannot be settled fully, even though the trespasser be arrested within a year after committing the trespass, with exception, however, that all questions for which the trespasser is answerable at the civil courts can be brought before such courts even after the three years are up.

SEC. 157. The punishments decreed against trespassers are of no effect after two years from the day of sentence, even though the trespasser renders the payment of penalty impossible by flight.

INDIVIDUAL TRESPASS AND DEGREES OF PUNISHMENT.

SEC. 158. Any person who commits a trespass by stealing wood or other forest products, must, (a) pay the worth of the stolen goods so far as they cannot be restored; (b) and must pay all damages, &c. To define the worth referred to, the forest officials, with the consent of the higher officials, will declare the worth, basing it upon the local market price value of the stuff stolen, exclusive of costs of piling, preparing, transporting, and shall issue said tariffs every five years, and shall announce the same in the public press of the district. The decrees concerning further damages are to be found in sections 161-166.

SEC. 159. The trespass shall be regarded as fully completed in the case of standing wood just as soon as the trespasser has felled or rooted up a tree, even though he has not yet appropriated the wood to his own use; also, when by "wounding a tree" it dies must the punishment be in full just the same as if the wood had been removed.

SEC. 160. For the purpose of determining how much wood has been taken, in case of a trespass, the forester will use the tables approved and established for such purposes.

As regards the removing of standing wood the measure will be taken as laid down in section 19, although the trespasser should cut much higher up. If the tree has been rooted up then the trespasser will have to pay for a tree as large as the forester and forest officials shall determine that the one taken measured. The length of the tree will be determined by the forest authorities where exact measure is not at hand.

SEC. 161. In cases of stealing wood, besides the value of the wood, the following expenses must be added:

1. For taking standing-pole trees and other trees in forests of low trees: (a) For a tree under 3 inches diameter, double the worth of the tree; (b) for a tree from 3 to 6 inches, three times the value; (c) for a tree more than 6 inches, four times the value.

2. For taking seed trees in high-tree forests without regard to thickness: (a) Where the trees have been taken from beds under treatment or the nursery, the single value of the tree must be paid; (b) in other cases double the value must be paid.

3. Without regard to the kind of trees, besides the value of the tree, the following: (a) For cutting down a tree in a tree range or promenade (*allee*), three times the value; in a tree nursery school (*baum schule*), three times the value; (b) in all nursery beds of young trees, twice the value must be paid.

4. For digging out stem-wood trees or in fresh sown reserves, double value must be paid, and in low-treed forest for digging out young stem-wood trees, four times the value must be paid.

SEC. 162. In cases where leaves, needles, moss, heath or forest wood, broom, reeds or other kinds of straw, or acorns, or bechnuts and other wood seed are taken out of those districts where to gather such is forbidden by the forest officials, a double value must be paid; and also when iron rakes have been used, reserving the rules in section 176, allowing a special punishment when persons commit a trespass against section 45, by taking the nuts, &c., from the trees, or when they do not again scatter leaves which have been raked together.

SEC. 163. When a person takes away pitch, after making the "taps" himself, or when he gathers it in the time or during the time when to gather is forbidden by section 50, then he must pay the full worth of the pitch as extra damage.

SEC. 164. For tearing off leaves for fodder or gathering grasses in forest where to do such, during a certain time, is forbidden (and indicated as is usual by tying wisps of straw to the trees), the trespasser will be compelled to pay a tax of 45 kreutzers (33 cents) for every crate full carried away, and in taking said leaves and grasses from other parts of the forest shall pay 15 kreutzers (11 cents) a crate. If the trespasser uses sharp tools in gathering such things he must pay double; for gathering buds or mistletoe he must pay 8 kreutzers (6 cents) per crate, and in all cases except where, for using spurs for climbing, he falls under section 175.

SEC. 165. In cases where (earth) loam, iron, ore, clay, gyps, sand, gravel, stone, mushrooms, turf or sods are taken from the woods the trespasser must pay, beside the actual worth of the thing or things taken, the damages done to the woods by his trespass in full.

SEC. 166. For stripping the bark from standing trees and for the harm done the tree (see section 175) a special punishment is declared, unless the taking of the whole tree was intended, for which case see section 159.

SEC. 167. Aggravating circumstances which affect the stealing of wood are:

a. The partial or complete outward changing of the article stolen or the preparing of the same for sale.

b. The using of a saw instead of an axe in felling a tree, or for using means to deaden the noise of the axe stroke or the grating of the saw. The existence of the foregoing aggravating circumstances or the union of these with any of those mentioned in section 149 gives the judge power to double the punishment.

SEC. 168. Punishment in the workhouse for from three months to a year will be pronounced in the following cases:

a. When a single trespass, or when in the case of one and the same person within a full active period of two months (see section 202); a series of trespasses along with the damages to be paid for stolen products (section 158, a) with the further payment of half (section 158, b) the damages (compare with sections 161-166, a) amounts to 80 gulden (\$60) or more.

b. When those persons who have relapsed at least three times and have in one of these trespasses entirely or partly changed the stolen wood or prepared it for sale (section 167, a).

c. Continued relapsing into trespassing.

SEC. 169. a. Those persons will be regarded as confirmed trespassers who have *twice* relapsed, under the condition that in each case of trespass the party has entirely or partially changed the outside appearance of the wood with a view to deceiving or has prepared it for sale.

b. Those persons will be regarded as confirmed trespassers who have relapsed three times, and in one of the cases of trespass changed the outward appearance of the wood or prepared it for sale.

c. Those persons shall be regarded as confirmed trespassers who have, within a period of two years, relapsed at least six times. All (a-c) with and under the condition that the trespass, especially those in one and the same active period (see section 202) taken together, the first as well as the last relapse, were punished by fine, &c., of 3 gulden (\$2.25), at least. This fine of 3 guldens to be composed of payments either on stolen wood, exclusive of rubbish wood, stolen pitch or bark, and also damages assessed according to section 173, c, for pasturing by night, and the *half* assessed for damages by section 174.

SEC. 170. Children under 14 years old shall in no way be punished for stealing from the woods; but the parents, if the children live at home, the father if living, if not the mother, and when the children do not live with their parents the guardians, must not only pay the fines costs, damages, &c., but will be punished for neglecting to watch the children, and the punishment may be just as great as if the parents or guardians committed the trespass in person, only no aggravating circumstances will be added or considered, nor will a trespass of a child for which the parents must answer be affected by the law in the preceding two paragraphs.

SEC. 171. The person who receives, buys, sells, &c., products stolen from the forests, when he knows they are such, or has a very good reason for believing them to be such, or suffers such to remain in his house, or helps to hide such, or who does not, without delay, report such things to the mayor or forest officials, will be punished even to as great an extent as if he had stolen or hidden the things himself, and he can be held responsible to pay all assessed damages and injuries. In enacting a punishment against such a person, further damages than those just mentioned shall not be assessed, nor shall aggravating circumstances which would affect the trespasser himself affect said person who conceals, &c.

SEC. 172. The stealing of prepared, piled or wood prepared for transport, or stealing of forest products already gathered, if they were not gathered or prepared by the trespasser himself and his accomplices, will be punished as theft by the civil courts.

TRESPASS BY INJURING OR BY GOING OUTSIDE OF THE LAW, AS LAID DOWN BY THE FOREST REGULATIONS.

SEC. 173. For pasturing in the woods without having a right to do so, the following (money) fines will be assessed:

a. For pasturing cows, horses, asses, hogs, except in mast (fattening) time, 30 kreutzers (22 cents).

b. For pasturing goats, sheep, or swine during the *mast* time, 40 kreutzers (27½ cents).

c. For pasturing geese, 6 kreutzers for each goose. In case of many geese the fine cannot go over 3 gulden (\$2.25), and for a large number of cattle the fine must not go beyond 30 gulden (\$7.50).

If the trespass is committed in those parts of the forest or districts especially marked with straw wispes, the fine for one or for several will be four times as much as when the trespass is made in other parts. The regulation in section 124 comes into use here also.

SEC. 174. The punishment will be visited upon the shepherd; in case the owner has not given the cattle into a shepherd's care, then the owner must suffer. One half of the damages declared in the preceding paragraphs shall be paid over to the person against whom the trespass was committed. The owner of the cattle, who has appointed the trespassing shepherd, is not only responsible in all cases to make restitution or give satisfaction, but is at the same time liable to a full fine for all damages, &c., when he has been the party at fault. The owner will be considered guilty of such a fault so soon as a shepherd in his employ falls back into a trespass two or more times.

SEC. 175. A fine of from 15 kreutzers to 15 gulden must be paid in the following cases:

a. The wounding of standing trees by barking, cutting a ring round a tree through the bark so as to have the tree die, cutting of the tap, breaking or cutting of boughs and branches, cutting or sawing of same, the tearing away of or chopping off or digging up of roots, climbing the trees with spurs on the feet, boring into the trunk, jarring the trees by pounding the trunk with huge stones to shake down the nuts, &c., and all such acts which do not come under section 159 as stealing.

b. The injuring of or destruction of wood lying in the forest or of other forest products and other kinds of forest injuring, the destroying of the signs, roads, beds, or houses and huts.

In all these cases must the estimated values of damages be paid, and the severest penalties come into operation when the harm, trespass, &c., has been out of spite, revenge or pure wantonness, as the removing of stones set as marks, for forging rights, &c., or for setting fire to the forest, the heaviest penalties of the civil courts will be brought into operation.

SEC. 176. The violation of the statute in regard to protection against fire (sections 60-67) will be punished by fines ranging from 30 kreutzers (22 cents) to 20 gulden (\$8.50). The violation of the statute relating to the building of houses, &c., in the immediate neighborhood of the forest, especially the opening of workshops or wood-yards in such buildings (sections 57-59) will be punished by fines ranging from 5 to 30 gulden (\$2.25 to \$12.75) with the addition of the assessed damages and the tearing down of the buildings erected. The violation of such other forest ordinances, for which no fixed or definite punishment has been assigned, will be punished by fines ranging from 15 kreutzers to 5 gulden (3½ cents to \$2.12½).

SEC. 177. The violation of the forestry statutes by officials employed in looking after the rights of villages or corporations will be visited upon each official guilty of the violation of a statute by a fine or fines ranging from 1 gulden to 100 gulden (75 cents to \$42.50).

SEC. 178. Private owners who violate the forest statutes, the observance of which, by section 88, they are distinctly and absolutely bound, will be punished exactly the same as others who violate such statutes.

In cases where the question of violation on the part of a private owner refers to cultivating or using the woods, gathering forest products, &c., then will they be punished by fines ranging from 1 to 50 gulden, if they are summoned according to paragraphs 89 or 92 and 95, or if the damaged third party mentioned in section 91 proceeds against him.

PROCEEDINGS FOR THE PREVENTING AND PUNISHMENT OF FOREST TRESPASS—CONCERNING
THE CARE OF THE FOREST—THE FOREST GUARDS.

SEC. 179. For protecting the woods a sufficient number of guards must be appointed. Only (young) men of age and of good character can be chosen for such service. Foresters appointed by nobles and landlords, as well as those appointed by corporations and towns, must be approved by the state forest officials before they enter upon duty, and in case they already possess the right they may continue to exercise it unless the state officials object.

SEC. 180. The choice of foresters will be made from the district voters by the district officials after approval by the constituted forest officials.

Each wood guard, including those appointed by private owners, will receive his instructions from the forest authorities, and will be sworn into service by the district officials. When in service a forester must wear his uniform or badge of office.

SEC. 181. The pay of a forest guard in village forests will be paid by the town council and will be proportioned to the size and difficulties of his charge, always, however, being a decent salary. The salary will be fixed and definite, and shall be appointed or fixed by the district authorities with the approval of the forest bureau.

Foresters serving under other classes of owners of forests will have their pay fixed in the same manner except that the approval of the forest bureau alone will be sufficient.

The guard can demand that he be paid monthly. Claims against the foresters' wages by pawn, checks, distraint, &c., are not permitted.

Every agreement by which an official is promised a part of the proceeds of fines, &c., or where he may profit in proportion, as the fine is large or small, is forbidden.

SEC. 182. Different owners of forests, as towns, corporations or private persons whose forests are so situated that a general and particular oversight of all may be arranged in common, may, with the approval of the forest bureau, appoint and pay officials appointed by such owners conjointly, each man's payment to be settled before hand, and the forester must know from whose hands he is to expect his pay.

In case a forest owner can neither agree with others upon a common guard nor appoint one for himself within a certain prescribed time, then the forest authorities will propose guards to the district officials, who will appoint the same and fix their salaries.

SEC. 183. The forest treasury will pay one-half of all costs of cases in districts where the trespass has been committed, and charge it to the account of those who have to pay the guards; private owners or other kind of owners must then make up this half.

SEC. 184. The forest guard in town or village forests can be discharged at will by the district authorities after securing the approval of the town council and forest authorities. The other forest owners can dismiss their guards at any time without being compelled to assign a reason.

The forest bureau can demand the dismissal of a forest guard in the interest of the public. The owner in such a case can have recourse to appeal to the local government.

DUTIES OF THE WOOD GUARD.

SEC. 185. A wood guard must, in his own district, so soon as he has knowledge of it, report each case of trespass; he must also report any trespass seen by him in another district, and stop, if possible, the carrying out of the trespass. An exception to this rule is in the case where a private forester finds the owner carrying out what by another would be trespass, unless it comes under sections 88, 89, 92, 93 and 95.

SEC. 186. The forest guard must carry a day-book in which he shall make entry of each and every discovery of trespass and information relating to the same, arranged circumstantially and closed in at the end of each day. He must make no changes in the book, but if anything is to be added by way of explanation it must be entered in order; no scratching or blotting out will be allowed. In case of arrest (section 188), seizure (section 189), or sequestration (section 193, especially house searching, section 198), where a special record is taken of every proceeding, the forest guards present will make a slight entry in their day-books referring to the case. All entries in the day-book must be written and signed by the wood guard himself. The guard must show his day-book to the mayor of the town and once a month to the forester.

SEC. 187. In cases where the towns appoint, in addition to the ordinary wood guards, special overseers or wood masters, and have such men sworn into service, these men, as well as the foresters and other forest officials and their sworn-helpers and the gendarmes (police), so soon as they have knowledge of a trespass, have the same duties, the same right to belief, and the same rights in general as the wood guards. In case they carry no day-book, they are in duty bound to make an exact record of all circumstances in a case of trespass, house-searching, &c.

ARREST, DISTRAINT, AND SEQUESTRATION.

SEC. 188. The wood guard has the right and is in duty bound to arrest any person found trespassing and to bring such person before the mayor of the district—

a. If the person is a stranger to him or a foreigner.

b. A citizen who, after being warned, does not stop trespassing and leave the woods at once.

In the last case the mayor (Bürgermeister) can let the prisoner go free, or to make sure of having for trial and to hinder his carrying out the purpose of his trespass, can lock him up for four and twenty hours. In cases where the wood guard arrests a stranger and brings him before the mayor, the mayor can let such prisoner free if he recognizes him as a citizen, or when the prisoner, if a foreigner, deposits bail sufficient to cover fines, damages, &c., in case of non-appearance in court, provided the prisoner is not a candidate for the workhouse under sections 168 and 169, in which case the mayor will hand him over to the district authorities for examination and punishment. In all cases must the mayor take notes of the testimony of the wood guard and the explanations of the prisoner and submit them to the district authorities.

SEC. 189. The wood guards are empowered, for the purpose of securing testimony and also to secure payment of damages, &c., to seize the cattle, tools, wagons, vehicles, &c., used in the trespass. The guard must deliver the same, when seized, to the mayor. When the mayor has made a record of the case, including the testimony of the wood guard and the trespasser, and has taken a full description of all the objects seized, and the trespasser gives bail large enough to cover damages, or in case of a foreigner gives enough to pay all expenses, then can the mayor allow the seized articles to be restored; otherwise he must retain possession of everything seized, and within 24 hours prefer charges against the trespasser or trespassers before the district authorities, submitting the evidence taken. If the mayor acknowledges a citizen as able and "good" for damages, he may be released and receive back the objects seized without giving a bond.

SEC. 190. If within ten days after seizure has been made the objects are not redeemed by a cash or other security as required by law, they will be put up and sold at public auction and sold by the district authorities, and after payment of costs the balance will be held until the case is settled and all damages and assessments have been paid. In case of first or simple trespass the district authorities may allow an extension of time before putting the trespassers' effects up at auction.

SEC. 191. If the owner of objects seized from trespassers proves that he had no part in helping or knowledge of the trespasser on the part of those who used his wagons, tools, &c., to carry out their trespass, he will be allowed to take such tools, &c., unless they be held in accordance with some claim against him from section 154, and if the things or part of them have already been sold at auction the owner will receive the proceeds.

SEC. 192. When it appears certain or decidedly apparent that a trespass is about to be committed and some object or objects are to be taken from the woods, the forest guard must remove such objects to a forest inclosure and mark it or them with his forest hammer, when this is possible. He must then notify the mayor who, also, when informed of a contemplated trespass, can order sequestration.

SEC. 193. The mayor will cause the arrest of all accomplices accused, and if circumstances demand it, he may order the arrest and detention of other parties as witnesses. The mayor must make a short notice of the entire case, which must be certified to by himself, the wood guard and parties accused; this report shall also contain a description of the goods and the place where they lay, and a statement, made by mayor and guard, of the value of the objects suspected of being about to be stolen. This report, with the mayor's and wood guard's remarks attached, will be sent by the mayor to the district authorities without delay.

SEC. 194. In case the suspected person admits to the mayor that the article marked by the wood guard as suspected was to be stolen, or in case the suspected person was a stranger, or is unknown, the mayor must sell the article at auction without delay, unless it can be secured at reasonable cost.

In case the owner of the article to be taken can be informed of the sequestration, without too much cost or delay, or can be informed before the auction takes place, such owner has a right to be heard in the matter if he appears before it is "knocked down" at auction.

SEC. 195. If the party arrested on suspicion declares to the mayor that there was no intention to remove the suspected object, the auction will not take place until the matter is fully investigated, so far as the suspected party, in the exercise of the rights guaranteed by law, declares that it be not sold.

SEC. 196. In those cases where the auction of the objects cannot take place at once the mayor must see that they are put in safe keeping. Only in cases where it cannot be otherwise arranged must the suspected articles be allowed to remain in the possession of the suspected party.

SEC. 197. If an article suspected of being an object of trespass is left in the hands of a suspected party in accordance with the provision of the preceding chapter, and such suspected party should of himself, or by conniving with some other party, have the object removed, then must said suspected party pay, not only the damages of the trespass, but the additional penalties for the embezzlement also.

If the object so entrusted or left in the care of a suspected party is stolen without his knowledge, but through his carelessness, so must he pay the penalty of his carelessness by a fine equal to the simple value of the stolen object; in no case, however, can this fine exceed 15 gulden (\$6.25). (A gulden equals 1 mark and 71 pfennigs.)

SEC. 198. For the purpose of carrying out the objects of section 192, in regard to sequestration, the wood guard search wood yards and places of like character in open places; but the wood guard must not enter houses, buildings or closed yards unless accompanied by the mayor or mayor's representative. The mayor or his representative must accompany the wood guard when the latter gives good and sufficient reason for suspecting that stolen articles are secreted in buildings or closed yards.

SEC. 199. The mayor will be paid for his labors in a seizure, sequestration, house-searching and auctioning off of goods, a sum fixed by law from the treasury of the forest department.

CONCERNING THE ACT OF TRESPASS.

SEC. 200. Notice of the act of trespass must first be made at the nearest local office, and then at the district office.

Soldiers who, whether on leave of absence or in the barracks, commit a trespass will be punished according to the military statutes relating to such acts. The determining of aggravating circumstances referred to in sections 168 and 169, which must be punished by confinement in the workhouse, must be done by the high court, and no one of the following paragraphs will affect such cases.

SEC. 201. The personnel of the trespass court will consist of a judge and his clerk.

The forester is in duty bound to attend the court to look after the public interests and to testify in questions requiring technical knowledge. A judge, mayor or the representative of either can attend court in another district when a man from their district is summoned on suspicion of having committed a trespass to answer in another district. In such cases the expenses of the mayor or judge so attending will be paid out of the forest treasury.

EXAMINATION AND SENTENCE.

SEC. 202. The trespass court will hold sessions in each district six times in the year, in the months of March, May, July, September, November and January. On the first day of each of these six months the wood guard will, in accordance with section 186, give up his day-book to the forester, who will make a record of the two months' entries and, with his own record for the same period (section 187), send it to the district office. The district office will then arrange the days for hearing the cases.

SEC. 203. In pressing cases where an arrest, a seizure or sequestration has been made the different questions can be solved in the time between such arrest, seizure, &c., and the appointed day for holding the district court. In simple sequestration or even in cases of seizure, with the exception of seizure of cattle, the cases can all be deferred until the regularly appointed days of trial.

SEC. 204. To the district hearing must the wood guard and the other witnesses or informants mentioned in section 187, also the suspected parties, and with them any parties or persons who may have to answer for said suspected (section 154) parties, be invited or summoned. At the same time the forester and the owner or owners of the forests in which the trespass took place will be invited to appear and to listen to such cases as concern them.

SEC. 205. The summoning of suspected parties and those who may legally answer for them will be done by means of a notice for each village. Said notice will contain a notice of the time and place when the case will be heard, the names of all those who must be summoned, a description of the object or objects suspected of being objects of trespass, also the name or names of the informers will appear. Said notice or copies of said notice will be placed in the hands of each party summoned, at least two days before the opening of court, by a court servant. As soon as the notice has been correctly served upon all parties in a village, and the same has been signed by the court servant, the mayor will seal it up and return it to the district office. The pay for his trouble in serving notices or summons will be drawn by the court servant from the forest treasury.

SEC. 206. An open summons, by means of a placard instead of a personal summons, may take place in the case of both natives and foreigners:

a. When the party to be summoned is living in another state and refuses there to accept a summons; or,

b. When the place of residence of a party to be summoned is unknown.

The placard must remain up eight days and a written statement that such has been done will be placed among the papers relating to the case.

SEC. 207. A person not appearing will be regarded as guilty if it is shown that he has been duly summoned and he does not afterwards prove that it was either impossible for him to appear, or that very urgent reasons hindered his attending. Any damages declared against a party summoned for not appearing will, upon sufficient proof of the impossibility of his appearing or of good reasons for his not appearing, being submitted and acknowledged as sufficient. Such proof however, if not presented within eight days after notice has been served will not affect the full punishment. And in all cases must the suspected or summoned parties pay the costs of the hearing granted him to submit his proofs of inability to come, whether he be declared guilty or not guilty of the trespass with which he stood charged, and to answer for which he had been summoned.

SEC. 208. Testimony of wood guard of what he actually saw himself or of such persons as are referred to in section 187 in so far as it agrees with the duly kept day-book notices, &c., in regard to a forest trespass, will be regarded as a full and sufficient proof, except in cases where the testimony entered in the day-book can be proven, for certain reasons, unworthy of belief. Other proof, however, in such cases shall not be excluded.

SEC. 209. The cases shall be summarized and the trespass register will serve as a means to fix the order of the trial. The facts elicited in the trial with the opinions of the court will be taken down and entered in columns and afterwards published. The protocol will be signed at the end by the judge or his substitute, by the forester and clerk of the court. It must contain mention of the fact that the summons had been made. The party not appearing will receive a special notice of the sentence, and a notice of his being notified of the sentence will be preserved among the papers relating to the case. The wood or forest owner also shall be notified in regard to damages declared in his favor.

SEC. 210. In case the local courts think a full statement of all particulars necessary for the purposes of justice then will a full and special record be made and entered in the universal register. If, on the days appointed for holding court, a case is not fully prepared for trial a day may be appointed at some time later, nor will it be necessary to wait for the next regular court sitting.

Several charges against one and the same person shall be dealt with and covered in one sentence. Charges, which cannot be dealt with by the trespass court, will be separated and dealt with at the civil or proper courts.

SEC. 211. In case a person charged with trespass lays claim to a right from a title or as owner or otherwise, and if such claim does not seem absurd or wrong, and if the same is not denied to such person by law or statute, civil or otherwise, so will said person be declared free of the punishment, in so far as the sentence may be affected by his right.

SEC. 212. In such cases as those mentioned in the foregoing paragraph, the trespass court will notify the forest owner or parties charging and acting against the suspected or accused party of his claims, and said owner or opposing parties must meet said suspected or accused party before the civil courts inside of six weeks, and this being done the forest court must be notified, in default of which, with the exception of claims by the civil courts, the suspected or accused party will be declared free. This sentence follows also, if proof is not sent in, that the said parties will meet within the six weeks before the civil courts, or that an effort has been made to do so. In case notice has been received that the case is to be brought before the civil courts to settle the question of right, all action regarding the trespass will be suspended, so far as it is affected by the civil questions, until decision has been rendered on the question of right.

SEC. 213. If the accused or suspected claims any of the rights of exception mentioned in section 211, especially that of his title as member of the town council, so must he, within a limit of time prescribed by the trespass court, bring proof from the town council that he is the possessor of the right claimed, and which is affected by section 212.

If the accused is unable to produce the proof of a right from the town council, but can show that certain citizens have gone to law to secure certain rights in accordance with section 125 of the town constitutions and are bearing the costs of the same, then will the decision of the court in regard to the trespass remain in obedience until the question before the civil courts is settled.

CONCERNING APPEAL.

SEC. 214. Without regard to the amount involved in a trespass which lies within the jurisdiction of the local trespass court, appeal may be made from the local courts to the district court by the party sentenced, as well as the forester, when the sentence is not satisfactory; this right does not, however, belong to the wood owners. Within eight days, however, after the appeal, notice must be filed with the upper court.

Carrying out of an appeal must be agreed upon by the forester and the opposed or accused party. In case a more full and thorough investigation is necessary, or if, upon appeal being made by the accused, an appeal is being considered, the local office will send up all the papers or copies of the same, with a full statement of the causes of the appeal; such papers, &c., with the reasons for their issue, will be laid before the district government. If the carrying out of an appeal is neglected during and through the time extended, it will be proclaimed forfeited or dropped by the local government.

SEC. 215. A request for an extension of time in which an appeal may be made and which can or may at any time be granted to a suspected party, has no effect on the full carrying out of a sentence, provided the appeal is made in consequence of neglect on the part of the accused to use the time first allowed.

On the part of a forester an appeal for extension of "appeal time" will not be granted only when he can prove that the causes of not appealing during the time allowed by law were not because of fault or neglect on his part nor even then will he be allowed an extension of time unless it be shown that for at least ten days before he makes his request for an extension that the causes of his previous detention have ceased to exist.

SEC. 216. After the case or cases have been tried a full report, so soon as the full carrying out of the sentence will admit, must be submitted by the local officers to the forest authorities.

CONCERNING THE CARRYING OUT OF SENTENCE.

SEC. 217. As soon as sentence has been declared the forest courts will see that it is carried out in each case.

So soon as within the time allowed and defined in the sentence the costs of damages, trial, &c., are not paid or made good, and when after seizure has resulted to no purpose in covering said costs, &c., can the forest court, allowing no appeal, put in force the substitute punishments prescribed in section 137.

SEC. 218. The forest treasury must receive all the money paid for damages, fines, &c. The treasurer will in each case pay the forest owner the assessed damages when recovered, and will also give him a list of the damages assessed, but which could not be collected, thereby leaving to the damaged party the privilege of having recourse to the civil courts to recover. In case the treasury has not taken in money enough to cover damages, costs, &c., the money received shall be applied, (1) to paying the damages; (2) to paying fines and costs of court.

SEC. 219. The cattle seized will be sold at auction when not redeemed within the time allowed by law for such redemption.

In case a trespass is proven, but the party trespassing is not discovered, the cattle caught and seized will be auctioned in the manner prescribed for other objects (section 190), but only after three months. The amount of money realized after payment of damages and costs will be deposited in the forest treasury to the order of the lawful owner if and when he chooses to claim it.

In other cases the amount realized, after paying damages, costs, &c., will go to the owner of the cattle or articles seized and sold.

TRANSITORY REGULATIONS.

SEC. 220. Present laws shall go into effect May, 1834. All previous laws in relation to woods and forests cease to operate from the date on which these laws go into effect. Any act

of trespass committed before these laws go into effect, or a case of trespass still pending before the courts, shall be decided in accordance with the old laws, except in such case where the new law is more moderate, in which case the new law can be applied. Further, the time allowed by sections 156 and 157 cannot extend beyond a year after the operation of these laws begin.

Given at Carlsruhe in the Grand Ducal Department of State on November 15, 1833,

LEOPOLD.

The foregoing laws have been subjected from time to time to changes of various kinds; sometimes parts of paragraphs have been removed, sometimes whole paragraphs and sections have been omitted or suspended. Said changes have taken place from time to time during the years extending from 1833 to the present day. However, no radical changes of the whole system have been made, the most of the laws, and in the same form as they left the hand of the original designer or compiler, constitute the forest laws of to-day.

The following are the changes and amendments:

SEC. 30. The first four sentences or divisions of the paragraph have been repealed.

SEC. 58. The concluding sentence of this paragraph was repealed in 1854.

SEC. 81. The former concluding sentence in which it is stated that 90 cubic feet of pole-wood make a cord has been repealed by the law of December, 1871.

SEC. 87. Loses that part of it after the words "of their wood" (*ihrer waldungen zu*).

Sections 88, 89 and 90 have been changed to read as follows:

SEC. 88. The private forest or wood owner is bound by sections 27 and 29 and by 30, so far as it affects wood intended for sale; by section 31, as far as it affects the placing of boundary stones, surveying and marking of boundaries; finally by sections 34-57 to 70.

The state forest officials can grant the single forest owners, in accordance with section 71, dispensation from the ordinance until it is revoked.

SEC. 89. The clearing or rooting out of a forest without permission of the proper authorities, as well as the destruction or endangering of a wood or forest by cultivating in a manner forbidden, is prohibited.

For clearing a wood or forest permission must be obtained from the forest state officials. The places cleared must be used for agricultural purposes within the time specified in the grant of permission to clear.

Permission to cut a clearing must be obtained from the forest officials, nor will such permission be refused if the artificial planting of the surface, in accordance with the circumstances of the case, is assured, the wood owner giving security for the carrying out of the cultivation.

SEC. 90. If a clearing of any kind is made without permission, or when a forest is so cultivated that its destruction is to be feared, especially if this takes place in or near a meadow; and if it appears that the immediate replacement of the trees cut down is not to be expected from young seed trees or from an adjacent nursery, or when, in case of the continued use of the forest products, the destruction of the forest becomes apparent, then must the forest guard report, and all measures must be taken in the one case to restore, and in the other to preserve:

a. All arable land, once wood land, which is in a state to demand care upon the appearance of these laws, and which has not been converted during the time allowed into land for agricultural purposes, will at once be converted into wood land.

The forest officials can compel the forest owner to give his first care and attention to such neglected land.

In case said owner should refuse the forest officials obedience, the latter will communicate with the district courts, and thus cause an order to be issued to the wood owner to cultivate the land designated.

If then the wood owner does not obey, the work will be done under the forest officials, and all expenses charged and collected, upon refusal to pay, under the civil courts. The expenses will be paid by the forest treasury and put to the forest owners' debit at $3\frac{1}{2}$ per cent. interest, and will be paid only at the end of five years, at which time the wood owner will have to pay all expenses incurred in the meantime.

b. In case a forest owner has had his forests put under the case of the state officials, because of his violating the statutes by marking clearings not allowed, &c., the forests will remain not less than ten years under government control. The same statutes that affect town and corporation woods affect private forests equally, except where the very nature of a difference in ownership requires a difference in the mode of applying the statutes. The private owner has to pay precisely the same reserve tax as town and corporation forest owners. In case the ownership should change hands during the ten years referred to above, upon application the new owner may be allowed to enter into the possession of his property and the governmental lien be removed.

All paragraphs from 137 to 178, inclusive, are repealed. The place or purpose of 183 has been supplied by another (48).

Such are the laws as they are in operation in the Grand Duchy of Baden. Fifty years has made little change in the original laws.

PENALTIES, ETC., IN CONNECTION WITH TRESPASS—FOREST THEFT—RIGHT TO PUNISH, ETC.

SECTION 1. Forest theft, as here understood in the law, is the theft in or from a forest or any other land devoted to wood cultivation of—

(1) Wood which is not yet taken from the tree or ground; (2) of wood which by accident has been broken off or hurled down, but which has not yet been looked after by the forest workmen; (3) of chips, splinters or bark, or other such forest products which have not yet been gathered and piled up.

PUNISHMENT FOR SIMPLE FOREST THEFT.

SEC. 2. Forest theft will be punished by a fine in money of four times the worth of the stolen articles, and must never be less than a mark (23 cents and 8 mills).

PUNISHMENT FOR AGGRAVATED FOREST THEFT.

SEC. 3. Forest theft will be punished by a fine eight times the value of the stolen articles and never less than 2 marks—

(1) When the theft is or has been committed on a Sunday or holiday, or between sunrise and sunset; (2) when the thief has used means to disguise himself; (3) when the thief gives a false name or dwelling, or refuses to tell his name and residence of accomplices or helpers; (4) when the thief carries any weapons except those which might be considered as necessary to cut or prepare the wood; (5) when the thief is caught using a saw in his thieving; (6) when the thieving consists of taking young trees, pole trees, seed trees, cutting down trees in a row, or taking trees from a nursery, or for taking pitch, resinous wood, sap, roots, bark, or the principal sustaining things of standing trees; (7) when the thief is or has relapsed the first or second time.

THIRD AND FOURTH RELAPSE.

SEC. 4. Forest theft in the third relapse will be punished by imprisonment for three months; the fourth relapse with imprisonment for six months, and further relapses will be punished with imprisonment for two years.

GREATER FOREST THEFT.

SEC. 5. In case the value of the object or objects stolen goes over 25 marks, the simple thieving will be punished by six months' imprisonment, if aggravating circumstances are at hand the punishment from one to six months relapse into grand forest theft, and will be punished by two years' imprisonment.

FOREST THEFT FOR THE PURPOSE OF SELLING.

SEC. 6. In case a forest theft has been committed for the purpose of selling the stolen objects, the thief will be punished by three months' imprisonment when the stolen object was worth 25 marks. In cases where the object or objects were worth more, the punishment may be for a year, and in case of relapse imprisonment for two years.

ATTEMPT AND ASSISTANCE.

SEC. 7. An attempt at forest theft or assistance rendered in the same may be punished, and in cases where a fine is imposed it will be the same as in cases of forest theft.

FAVORING THEFT OR RECEIVING STOLEN GOODS.

SEC. 8. The favoring of forest theft or the receiving of stolen goods taken from the forest, will be punished by a fine four times as great as the value of the stolen articles, but must never be less than a mark. In case the favorer or receiver of the stolen goods has relapsed once or twice, the fine will be eight times the worth of the stolen goods, and never less than 2 marks. Upon a relapse of more than three times, or upon the third relapse, the punishment prescribed in section 4 will be applied. To make a business of receiving stolen forest products or customary receiving of the same, will be punished by six months' imprisonment, and in case of relapse by imprisonment for two years or less.

WHAT RELAPSE MEANS.

SEC. 9. Any person is considered guilty of a relapse who has been punished before a court of Baden for any forest theft or attempt at same, or for assisting, favoring theft, for concealing stolen goods, &c., and who, within a year after sentence, commits any of the above mentioned acts.

YOUTHFUL AGE.

SEC. 10. Children shall not be punished for forest theft.

MEANS OF VALUING THE STOLEN GOODS.

SEC. 11. The worth of the stolen articles will be estimated from prepared tables issued every five years, and said tables shall be based on the local prices.

MEANS TO BE EMPLOYED IN ESTIMATING THE VALUE OF WOOD.

SEC. 12. The cubic contents of the wood stolen will be estimated from or by the tables, but in case no means are at hand to attain the measure of the wood taken, the measure will be based upon the opinions as to the amount expressed by the forest officials.

APPLICATION OF FINES AND DAMAGES.

SEC. 13. In cases of forest theft one-half of the fines adjudged and paid go to the party or parties damaged after the full costs have been deducted. This award, however, does not prevent the injured party from seeking further damages before the civil courts.

LIABILITY OF A THIRD PARTY TO FINES.

SEC. 14. Persons who stand in the relation of parent, guardian, teacher, &c., to a person arrested for forest theft may be held responsible for such person unless it can be proven that they could not hinder the theft.

CHANGE OF FINES TO OTHER FORMS OF PUNISHMENT.

SEC. 15. A fine declared against a person who is unable to pay the same will be changed first to imprisonment. The change will be based upon the following: for every fine under 50 marks one day's imprisonment will be substituted for every 2 marks; when the fine is over 50 marks twenty-five days' imprisonment will be put against the 50 marks, and one day's imprisonment against every 5 marks over 50.

Imprisonment to take the place of a fine can never be less than one day and never more than 180.

When a fine is divided and a fractional number comes out more than a half it will be counted a whole one, when less than one-half it will be thrown out.

In case a part of the fine can be paid the imprisonment will be made equivalent only to the amount of money left unpaid. If, in the estimate of the number of days, a fraction of a day should appear in the result the whole day will be reckoned.

CARRYING OUT OF THE IMPRISONMENT BY AN EQUIVALENT IN FOREST OR TOWN WORK.

SEC. 16. Instead of the imprisonment referred to in section 15 the prisoner can have his punishment changed into labor on the town work or forests. The prisoner can have a certain amount of work assigned as an equivalent of his imprisonment and will be declared free so soon as the work is accomplished.

WORK IN FAVOR OF THE DAMAGED PARTY.

SEC. 17. In case those officials who have charge of watching and directing the town and forest public work are informed by some party who has been damaged by the prisoners that he has work for them to do, &c., the prisoners will be put at that work unless they have already commenced on some other, and no money shall be demanded from the damaged party receiving such labor except pay for superintending the labor; but the work done will go toward paying the damages.

CARRYING OUT OF PUNISHMENTS.

SEC. 18. The art and manner of carrying out the punishment will accord with the form and manner prescribed by the statute.

FORFEITURE OF TOOLS, ETC.

SEC. 19. In addition to the punishment declared against a person for forest theft will be the forfeiture of all tools, instruments, &c., used by the prisoner whether they belong to himself or not.

UNLAWFUL PASTURING.

SEC. 20. The pasturing of cows, oxen, horses, asses, goats, sheep and swine without a right to do so will be punished by a fine of 1 mark (24 cents) for each head, but the fine can never be more than 50 marks.

If the trespass takes place in places set apart for young trees then will the fine be three times the above. Young cattle or animals so long as they are sucking young, will not be counted.

RESPONSIBILITY OF THE OWNER FOR A HIRED SHEPHERD.

SEC. 21. If a cattle owner is brought up for a shepherd or herder's trespass (sections 14 and 23) he must be allowed no excuse if the herder or shepherd has twice committed the trespass during service with the owner inside of one year.

INJURING.

SEC. 22. If trees have been injured or other forest products destroyed, injured, &c., by parties having no right to take or consume, and the amount of damage does not exceed 25 marks worth, a damage of four times the worth will be declared against the offending party and the fine can never be less than 1 mark. A motion for punishment will not be necessary in such cases.

COMMON PURPOSES OF SECTIONS 7, 10, 13 TO 17 WITH 23 AND 22.

SEC. 23. The purposes of sections 7, 10, 13 to 17 with 22 can be brought into application in cases of unlawful pasturing and injuring of the forests.

OPPOSITION OR VIOLATION OF THE FOREST POLICE REGULATIONS—UNLAWFUL BUILDING NEAR A WOOD OR FOREST.

SEC. 24. The violation of the law as laid down in sections 57 to 69 of the forest laws will be punished by a fine as high as 150 marks.

ENDANGERING THE FORESTS BY FIRE.

SEC. 25. The violation of the law, as laid down in sections 60 to 67 of the forest laws, will be punished by a fine as high as 60 marks, or fourteen days' imprisonment.

UNLAWFUL OR UNPERMITTED CLEARING.

SEC. 26. The unpermitted clearing out of a wood or forest by rooting out, cutting down, destroying or endangering of a forest will be punished by a fine of as high as 1,500 marks.

The punishment can be put at the full value of the wood or damages, when this goes over 1,500 marks, and imprisonment for six months.

Upon the ground of a judicial sentence, the party sentenced can be placed under the surveillance of the forest authorities (section 90 of forest laws).

OTHER SPECIALLY PUNISHED VIOLATIONS.

SEC. 27. A fine as high as 150 marks will be declared—

a. Against forest officials who violate the ordinances in regard to forest cultivation.

b. The violation of section 95 of the forest laws.

c. For neglecting to cultivate lands intrusted to him by a private owner by a forest town or corporation official.

Sentence 3 of section 26 may be used also against such officials.

OTHER VIOLATIONS NOT SPECIALLY NOTICED WITH PUNISHMENTS.

SEC. 28. The violation of statutes for which no special punishment is laid down, will be punished with fines ranging from 1 to 10 marks.

UNLAWFUL DELAY IN THE WOODS AND UNLAWFUL COLLECTING OF BERRIES.

SEC. 29. Will be punished by fines from 1 to 10 marks (1) any person who is found in any other part of the woods than in the open public paths, and who has not a right to be in other parts, and who is caught in carrying out a forest theft. (2) Any person who gathers berries, vegetables, herbs, &c., against the will of the owner after he has forbidden such gathering.

These changes and new laws found themselves upon the condition of affairs in the Grand Duchy, many alterations being based upon circumstances peculiar to certain districts, yet all growing out of changes found necessary to the original laws. It is not thought necessary to record each trifling change.

SPECIAL FOREST PROCEEDINGS AT LAW IN THE CASES WHERE SPECIAL OPERATIONS ARE NEEDED.

SEC. 1. The representation of the state shall lie in the hands of the forest officials. When a case comes up to the principal courts exceptions to the first part of this rule may be made. The sentence shall be pronounced by the local judge, without assistance from his sheriffs.

JURISDICTION.

SEC. 2. The jurisdiction in regard to all persons participating in or encouraging theft, or receiving stolen goods, is limited to the district courts in the district where the act was committed.

In case the exact place where the trespass or theft occurred cannot be known, or in case it has been done outside of the territorial limits of Baden, then the limit of jurisdiction will be defined or declared in accordance with the statutes relating to such cases.

PERIODICAL DECLARATION OF SENTENCES.

SEC. 3. The sentences will be proclaimed periodically, and will be based upon the registers kept and handed in by the forest officials. The registers will contain a statement of how great a sentence should be pronounced against each case reported. In urgent cases, upon request of the forest officials, cases may be settled at once, even though they do not come in the order registered.

COMMANDS TO PUNISH.

SEC. 4. The district judge will at once order punishment against all parties to be punished on the grounds of the foresters' register.

If there do not stand too weighty reasons for doing otherwise, the demand made by the forest authorities will, in each case, be put in operation.

PROTEST ON THE PART OF A THIRD PARTY.

SEC. 5. The legal representative of a suspected party, such as the husband of a suspected woman, can, within the time allowed by law, enter protest.

Upon such a protest, the statutes and rules that operate in case of direct protest shall be effectual.

SEC. 6. All evidence in a case will be demanded by the district judge without delay; the same may afterwards be proved judicially.

GENERAL INDICTMENT.

SEC. 7. For all the cases of a forest district against the sentences of which protest has been entered or which have been referred to the higher courts, &c., will, as a rule, be tried in a bunch.

TAKING THE OATH.

SEC. 8. Persons intrusted with the care of woods or forests can once for all be sworn into office. (1) If they are appointed by the state or a corporation; (2) if they have been appointed by other forest owners with the consent of the forest officials.

SEC. 9. The swearing in will take place before the district court in the district where the party to take the oath lives. He must swear that he will report all actions or acts against the forest laws against the forests trusted or to be trusted to his care; further, that in all his official actions in regard to the same as far as he knows he will state the truth, that he will conceal nothing, add nothing and that the woods or forests intrusted to his care will be guarded in a most impartial manner so far as his knowledge or conscience can guide.

A complete record of the swearing in of an official will be transmitted at once to the district where the newly-sworn-in official is to labor.

PROTOCOLS.

SEC. 10. As a common protocol for grand action the forest register must serve, in which, for each case, the principal actions in the lower court, sentence, &c., must be entered. Reasons for the sentence must be given if it does not accord with the definite parts laid down by section 3.

COSTS.

SEC. 11. The suspected party, as well as the party sentenced, whose protest has not been allowed, must pay the expenses incurred by their appeal or protest.

THURINGIA.

REPORT OF CONSUL BISCHOFF.

Thuringia is widely known for its vast forests, covering an area of over fifteen hundred English square miles. The careful attention devoted to the cultivation and preservation of these forests, presents such a contrast to the reckless destruction of forests in the United States, that a stranger, and more especially perhaps an American, is struck with wonder and admiration. It is doubly so, when he observes that these forests, instead of being a source of continual expense, as is generally supposed must be the case in cultivating woodlands, are not only very profitable, but actually form one of the chief sources of incomes of some of the Thuringian states.

Under the name of Thuringian states are to be understood all countries lying between the Prussian provinces of Saxony and Hesse-Nassau, the Kingdoms of Bavaria and Saxony, namely: The Grand Duchy of Saxe-Weimar, the Duchies of Saxe-Meiningen, Saxe-Coburg-Gotha and Saxe-Altenburg, also the principalities of Schwarzburg and Reuss, with a total area of about seventy-five hundred English square miles and (1885) a population of 1,211,678 souls.

Forestry is here pursued in so careful and scientific a manner that not even ponds or marshes are allowed to be drained, if it should be considered dangerous to any of the neighboring forests. Indeed, in some parts of this consular district, the degree of excellence in which the forests are kept, and the profits which, under the most rigidly-economical management are derived therefrom, are perhaps nowhere exceeded.

A GLANCE AT GERMAN FOREST HISTORY.

At the beginning of the Christian era a dense, primeval forest covered the greater part of Germany. The inhabitants at this ancient period were nomadic races, like our own Indians, who gained their subsistence mainly by hunting and breeding cattle, while the entire forest lands were common property, which could be used by every free person according to his needs or pleasure. As a material for building purposes wood at that time possessed no value. The forests were mainly appreciated by the wandering tribes for the pleasant shelter which they furnished, the excellent protection against foreign enemies which they afforded, and for the profits which they yielded from the chase.

The Teutons, as the ancient inhabitants of these forests were called, were a terror to the Latins and the Greeks who described them as barbarians, and gave gloomy accounts of their distant forest homes.

None of the distinguished Roman heroes ever penetrated far into this unexplored territory, but contented themselves with driving these Teutonic hordes back to their bounds whenever they invaded Roman domain, spreading terror and consternation among its inhabitants.

At the early period in question whoever chose to uproot trees and clear a space for cultivation came thereby into possession of the land, and in this way began the right of ownership to the soil. The proprietorship in real

estate having been once acknowledged it followed easily enough that the forest lands lying contiguous to the "clearing" might be included in the possession. But this privilege of land owning was confined exclusively to free men, and it gradually became a necessity that this class should possess a fair number of broad acres. Therefore by this process of "squatting" and preëmption, the woods, which heretofore had been common property, as free to all as water and air, came at last into the hands of the few—the leaders and rulers of tribes and the heads of families.

After the lapse of time it became customary for the rulers to declare themselves the owners of immense tracts of forest, and to proclaim that the domain thus designated was to be devoted to the purposes of the chase.

Then officers were appointed to control the woods and to protect them from destruction, not for the value of the timber, but simply to preserve them for the chase.

The earliest efforts toward managing and protecting the forests appear, however, to have been imperfect and ineffective. So prodigally was the timber destroyed that in the twelfth century the woods in many parts of Germany were devastated and uprooted. To check this evil stringent laws were enacted, reaching so far as to impose the cruelest death penalties upon persons who might wantonly burn the forests.

Hans Carl von Carlowitz, in his "*Sylvicultura Œconomica*," 1713, writes: "From the little information we have of the condition and quality of woods it must be acknowledged that within the last few years more wood has been consumed in the middle European countries than could grow in several centuries. From this it is easy to see what the end must be. The trees are destroyed, the forests that make a country prosperous are gone, the mountains and hills are bare."

In the next chapter he states: "It is an almost universal fact that everybody prefers to possess fields and meadows rather than wood land, and is therefore inclined to root up and destroy the latter as if it was only a weed patch without any value to domestic economy."

The scarcity of funds in the state exchequer first directed the attention of the rulers in Thuringia to a more careful cultivation of the forests as a means of replenishing it.

Forest legislation in Erfurt began as far back as 1359. In the sixteenth century forest bureaus were first established and laws on the subject of forestry proclaimed by the respective sovereigns. For instance, the Saxon-Ernestine laws of 1556, and later those at Eisenach, 1645; Coburg, 1653; Jena, 1674, &c.

In the seventeenth century much attention began to be paid to the felling of the forests, in which strict rules were to be observed and an exact calculation was often made as to what per cent. of territory in a duchy or principality might be felled in any one period. The planting of young trees was also greatly encouraged. All this was but the beginning of the splendidly-developed system of forest culture and forest preservation in Thuringia.

LACK OF FOREST PRESERVATION IN AMERICA AND ITS CONSEQUENCES.

Since there is as yet very imperfect legislation on the subject of forest preservation in America the owners may clear off or cut away large tracts of wood land at random until in districts formerly well timbered there has come to be a scarcity of wood for fuel and building purposes. The attention of our farmers is not sufficiently called to this subject, and they fail to realize thoroughly the great importance of preserving the existing wood land or the growing necessity in many States of increasing the amount of land under forest. Our Government in the past has given no encouragement to persons to study the science of forest economy, and consequently the whole subject is left in the hands of the careless and ignorant. Not to speak here of those cases in which fruit trees are injured and the wheat in winter killed because the destruction of the forests has prepared the way for biting frosts, the general result of the lack of forest economy in our country may be stated to be a constant lessening of the proportion of the area under forest, while most European countries are continually increasing the same.

It is of interest to note how rapidly the forests were swept away during the eighteenth century in France.

The area under forest in that country was:

In 1750, 37,055,000 acres, or of the whole 27 per cent.

In 1788, 19,768,000 acres, or of the whole 14.8 per cent.

In 1791, 14,961,905 acres, or of the whole 10.9 per cent.

In 1881, 20,749,311 acres, or of the whole 15.1 per cent.

It should be noted in the foregoing statement that forests are much more easily destroyed than replaced, for in the three years, from 1788 to 1791, almost as large an area in France was deforested as has been reforested in the last ninety years, although much attention has been paid to the subject during this time.

These simple facts ought to excite some thought with reference to taking timely steps toward the adoption of some system for the preservation of our American forests, which are now so rapidly disappearing.

THE INFLUENCE OF FORESTS ON THE CLIMATE, SOIL, RAINFALL, ETC.

It was very early recognized that the cutting away of the forests exercised a damaging influence on the physical condition of a country, which was often fatal to the prosperity of a large number of its inhabitants. Plato, in "Crito," gives an account of the "sickening of the country" because of deforestation. As a general rule the anxiety in earlier times was caused by a fear or the scarcity of firewood and building material, but in the mountainous districts, as well as where sand dunes and waste places abound, a very large influence on the fertility and productibility of the land was attributed to the forests.

The oldest writing on this theme is from the Spaniard, Fernando Colon (died 1540), who, in his "Life of Admiral Almirante," says: "The Admiral ascribed the many refreshing showers to which he was exposed, as long as he sailed along the coast of Jamaica, to the extent and density of the forests which

covered the mountains," and remarked that in earlier years the amount of rain on "Madeira, the Canary and Azores Islands was just as large, but that since the trees that spread out their shade over the land had been cut away rain had become more seldom."

Examples of the truth of these observations may be pointed out in almost every country. In all the forest academies of Germany the most careful attention is at present given to this important subject. It is thoroughly believed in these schools that forests moderate the extremes of temperature, and that such extremes of heat and cold do not occur in well wooded districts as are to be observed in districts devoid of forests.

The important meteorological observations of Dr. E. Ebermayer, professor at the Forest Academy of Aschaffenburg, in Bavaria, show that the mean temperature of the air throughout the year is cooler in the forest than on open land, but that this difference seldom exceeds 1° Celsius.

The following table shows the result of this observation for the different parts of the year:

Showing the difference between the temperature of the air in forest and on open land, from observations made in five different states for each season of the year.

States.	In spring.			In summer.			In autumn.			In winter.		
	Middle.	Highest.	Lowest.	Middle.	Highest.	Lowest.	Middle.	Highest.	Lowest.	Middle.	Highest.	Lowest.
^a Prussia.....	-0.23	-0.80	+0.26	-0.76	-1.76	+0.11	-0.35	-0.82	+0.01	-0.05	-0.48	+0.26
Bavaria	-1.27	-2.06	+0.06	-2.04	-2.92	-1.01	-0.74	1.20	-0.19	0.47	1.33	+0.60
Switzerland	-0.74	-1.02	-0.42	-1.51	-1.64	-1.34	-0.87	-0.92	-0.82	-0.51	-1.03	-0.20
France	-0.43	-0.90	-0.20	-1.03	-1.20	-0.90	-0.70	-1.00	-0.30	-0.37	-0.70	-0.20
Württemberg	-0.80	.....	.....	-1.70	.....	.....	-0.50	.....	.....	-0.30	.....	.....
^b Prussia.....	-0.06	-1.15	+0.36	-0.40	-1.20	+0.36	-1.02	-1.15	+0.30	+0.08	-0.59	+0.29
Bavaria	-0.42	-0.89	+0.15	-1.07	-2.23	-0.25	-0.27	-0.46	-0.01	0.00	-0.26	-0.47
Württemberg	-0.50	.....	.....	-1.00	.....	.....	-0.20	.....	.....	0.00	.....	.....

^a. Five feet above the ground.

^b. At the tops of the trees.

(-) lower, or (+) higher than in the open land, degrees : Celsius.

The following table gives the difference in temperature according to observations made at Berne, Switzerland :

Showing difference in temperature 10 feet above ground, according to observations at Berne, Switzerland, for the years 1869 to 1880.

Years.	Spring.	Summer.	Autumn.	Winter.
1869.....	-1.02	-1.27	-1.09	-1.39
1870.....	-0.67	-0.90	-0.39	-1.24
1871.....	-0.66	-1.21	-0.23	-1.63
1872.....	-0.73	-0.42	-0.76	-1.28
1873.....	-0.89	-1.74	-0.93	-0.98
1874.....	-1.25	-1.46	-1.28	-0.89
1875.....	-1.16	-1.59	-0.93	-1.04
1876.....	-1.09	-1.16	-0.96	-0.52
1877.....	-1.09	-1.71	-0.94	-0.36
1878.....	-1.21	-1.50	-0.86	-1.05
1879.....	-1.05	-1.56	-0.76	-2.12
1880.....	-1.23	-1.55	-0.79	-0.06

The foregoing table indicates that the temperature throughout the year, on an average, is lower in the forest than in the open land; but this cooling influence is most noticeable in mid-summer, is very small in winter, and is about half way between the two in spring and autumn.

The difference between the temperature of the ground in the forest and on open land for an average of twelve years (1869 to 1880), at three stations in Switzerland, was as follows:

Station.	Species of wood.	On the surface.	12 inches deep.	24 inches deep.	40 inches deep.	50 inches deep.
Interlaken	Larch trees, 50 years growth.....	-2.34	-1.41	-0.77	-0.69	-0.94
Berne	Pines, 40 years growth.....	-2.15	-2.53	-2.77	-3.04	-2.84
Pruntrut.....	Beech trees, 50 to 60 years old....	-2.45	-1.50	-1.39	-1.51	-1.54

It remains, however, to be demonstrated how great the influence of this difference of temperature in the forest and open land is on the general climate of the country, and whether the temperature outside of the forest is conditioned upon it.

No data are given as to what proportion of forest is the most favorable for vegetation and health.

The relative humidity of the air in the forest and on the open land is given by Professor Ebermayer, as follows:

	Open land.	In the forest.	Difference.
In spring.....	74.96	80.60	5.70
In summer.....	71.92	81.20	9.28
In autumn.....	82.72	87.94	5.22
In winter.....	84.19	89.43	5.44

The foregoing table shows to what degree the air in the forest is filled with moisture caused by the evaporation of the water that is held in the forest. Not all the water falls upon the ground, but a large amount remains on the leaves and evaporates. According to the investigations of Ebermayer from 100 per cent. of rain falling on the open land there reaches the ground in the forest—

	Per cent.
In spring	68
In summer.....	72
In autumn	73
In winter.....	75

According to the observations of Mathieu, a celebrated French scientist, from November to April 13 per cent., and from May to October 18.8 per cent., or an average of 16 per cent. for the year, of the rainfall is prevented by the trees from reaching the ground. That which falls to the ground is also better protected from evaporation because of the lower temperature and less movement of the atmosphere in the forest than on the open field.

Ebermayer states the evaporation from saturated ground as follows :

100 volumes on the open land.

38 volumes on naked land of the forest.

15 volumes on land of forest covered with litter.

In the forest more water sinks into the ground than in the field, since there are so many more obstacles to prevent its flowing off, and since it is cooler here the snow does not melt so rapidly. From one to four feet deep deep under the ground the investigations, according to Ebermayer, give following result :

100 on forest land covered with litter.

85.8 on naked forest land.

56.5 on open land.

That forests of greater extent induce rain is a fact not much disputed by authorities on the subject.

The air within the forest becoming warm by the absorption of heat, both from the ground and the air next above it, leaves over the forest a current considerably colder than the neighboring air, and rain clouds passing over are, in most cases, condensed by coming into contact with this colder atmosphere. Authorities on the subject of forest culture, both in Prussia and Bavaria, are unanimous in the opinion that rainfall is more abundant and regular in districts well wooded than in bare lands.

The meteorological institute in Berlin intends to constitute a large number of stations in the German Empire for the purpose of making observations as to the nature of thunder storms.

Some of these observatories will be located on the highest points in the Thuringian forest.

RECLAMATION OF SAND DUNES OR WASTE PLACES BY TREE PLANTING.

The waste places in Saxe-Meiningen mostly consist of limestone formations, barren tracts of sandstone land and much less common, and when

such exist they are mainly swamps. These are first drained and then planted with young fir and pine trees (*pinus sylvestris*). Now and then the larch (*larix Europæa*) and the black pine (*pinus Austriaca*) are used for the same purpose, but experience in some parts of the country has shown that the two last named species soon fall a prey to insects.

In the duchy of Saxe-Meiningen much has been done in the last twenty or thirty years in the way of planting barren tracts of land with forest trees, and it is done wherever it is thought that the result would be at all favorable. Private owners generally plant these places for the needles that are used in place of straw for littering cattle to obtain manure.

Sand dunes are rarely found in Thuringia. There are many instances of tree planting in such districts in Northern Germany, where foresters claim that large tracts have been rendered productive by this means. The common pine is the tree that is planted in sandy soils.

DESTRUCTION OF FORESTS—CAUSES AND RESULTS.

Forests are destroyed by fire, by wind storms, and, to some extent, by the heavy snow fall, which not unfrequently occurs in this section of the country, and by insects.

The ravages of these insects, however, seldom spread over any considerable tract of woodland; they are usually checked at the very beginning. The watchful eye of the efficient forester, in making his daily rounds through the woods, never misses anything of that sort, and vigorous steps are taken at once to get rid of these vermin.

A good forester knows immediately by the sickly look of the trees that they are infested with insects, and those badly damaged are removed altogether, while trees that are less affected receive a radical cleaning until the purpose of extermination has been accomplished. As a means of preventing insects from spreading in the forests all unhealthy trees are speedily felled and taken away, for they are much more unlikely to enter sound trees. Young trees are seldom troubled by insects. Usually the presence of the destroyer is only to be feared after the trees are thirty years old.

Much destruction occurs from fires. They are usually the result of carelessness. Since the existing forest regulations do not permit the litter that falls upon the ground to be removed it is but natural that it will in course of time accumulate enough to become a great danger to the forest when dry, in which condition it burns like tinder, and is most easily ignited. Thus dry litter, by accident or otherwise, not seldom causes disastrous conflagrations in forests.

My informant relates a case of his own experience, in which a fine forest was set on fire and partially burned by a cigar stump carelessly thrown away by his friend, in whose company he was strolling along the forest road.

Districts thus destroyed are at once replanted, and the relative amount of forest and cultivated land constantly remains about the same. Of course the districts thus affected are too small to have any remarkable effect on the

climatic relations or rainfall of the surrounding country, but several of the foresters here whom I consulted on this very subject cite instances, especially from Italy, Switzerland and France, where entire districts have been indiscriminately deprived of their forests and the hills laid bare, in which the rain does not now fall in sufficient quantities nor with the same regularity as in better wooded districts within the said countries.

DIFFERENT PROPRIETORSHIPS OF FORESTS—STATE, PRIVATE, ETC.

There are five different classes of forests in Thuringia as well as in other parts of the German Empire, namely; State forests, community forests, forests belonging to charitable institutions, forests owned by corporations and private forests.

The most numerous class in the empire is private forests, while in Thuringian states, however, the domain or state forests predominate.

The state forests are under the direct control of the states and their right to them cannot be abrogated. They cannot be in any way disposed of without the consent of the Minister of Finance, and in most cases the assent of the highest ruler in the state is necessary to carry out the object. The state is constantly seeking to increase its forest possessions and avails itself of every opportunity to add to its acreage by purchase.

The state foresters are on an equality with other state officers as respects pay, pension, &c., since all such matters are regulated by law. Their qualifications are determined by examination, so that the design of having only useful foresters is fully carried out. The physical strength of such officers must be sufficient for the practical service that will be required of them and must be certified to by a military physician. That they may be accustomed to rigid discipline, several years' military service is required. Their pay is not such that they can save from it, but they are granted a pension after they are too old for active service.

Private forests are, as the name indicates, those owned by private individuals. These forests are under control of the owner in most respects, but may not be turned into fields without the consent of the state authorities. It is complained by many foresters that the private forests are not generally managed to the best advantage. The owners are too afraid of making the necessary outlay. On this account such forests are often not planted with the most valuable woods, but with those kinds the plants for which are already in the nursery. The private foresters are also very poorly paid. The same wages in a good many cases are still paid as fifty years ago, while the price of living has greatly increased. Often they receive yearly no more than \$30 in money; in addition to this they sometimes are paid a small compensation in cash for the killing of game, yet hardly sufficient to pay for the ammunition; then they receive some fire-wood, a quantity of rye, barley and peas, scarcely enough for four persons (while often his family contains six to eight), and are also allowed the use of a small garden and potato-patch as well as a dwelling, which, as one writer says, could only satisfy an Esquimaux or a Samoyed.

Of course, there are better situations in connection with private forests where the territory is of larger extent, and in which case more favorable conditions are offered to the forester, but they are not numerous.

It may not be amiss to quote at this instance the recommendation for improvement in private forestry by a practical forester, writing on the subject of private forests and foresters in Germany. He says:

(1) A special map of each forest possession,—a sketch of the surface and a general plan of work should first be carefully prepared and the latter should be strictly carried out.

(2) A thoroughly competent person should examine the woodland to see whether it is used to the best possible advantage.

(3) When any change is made, no time should be lost in replanting or improving, when improvement has been found necessary.

(4) The foresters should be given their place for life, and not be changed from one place to another, except under the most pressing necessity.

(5) The foresters should be paid a good, living salary, and this should be made certain to them.

(6) No private forester should be engaged who has not insured his life with a good company and shown that he has promptly paid his dues to the same. This is necessary that the support of his family may be secured for a time in case of his death.

The author of the foregoing suggestions, as he undertook the management of a valuable private forest in 1860, received from his predecessor in office an incomplete file of documents, entitled "Abrogation of Forest Rights;" an entirely useless map without a scale of miles, drawn by a student thirty-six years ago; a few blank forms, a so-called account-book for forest products after a model from the year 1808; a worthless wood-hammer; a leather-measuring line originally six feet in length, but which had become three inches longer by much use—aside from this, nothing; and yet this district was cited as well managed.

Next in importance stand the

COMMUNAL FORESTS.

These are in the possession of communities or townships. The cultivation and management of these woods, as well as all others not owned by the state, are placed under the supervision of the state government. Communal forests are most numerous in the more level districts, while the domain or state forests prevail in the mountainous portions of Thuringia and are but sparsely settled.

These possessions for the most part date from early times, and were either received as donations or ceded by purchase from former princes and noble-men. The members of the community enjoy various privileges with reference to these woods. In some communities each householder receives yearly a certain amount of firewood and timber for building purposes "free of charge," while again in other localities only a nominal price is charged for it; in some places nothing but the mere expense for the labor and hauling is to be paid. Also litter, moss, and shrubs may, on permission, be gathered. In some communities, however, the same privileges are not enjoyed by all, but special rights derived from ancient private laws in favor of certain estates still prevail

here and there. As a general thing these old privileges are gradually in course of cancellation by purchase. Clergymen and teachers, independent from the general privileges, are in nearly all places entitled to free wood for fuel from the community forest.

In most of the German states, Thuringia not excepted, the foresters for communal woodlands are selected from the state forest official corps, and are generally placed on an equal footing with the latter as regards salary and duties. In no case may the communal forester be employed without the consent of the state government to which the community belongs. His position, however, if he does not neglect his duty, is a far more permanent and also financially better one than that of the private forester.

Quite a large area of forests in Thuringia are known under the name of

“SOCIETY OR CORPORATION FORESTS.”

These are, as the name indicates, in the hands of various corporations or voluntary societies. New possessions of this class are seldom acquired now; they date from earlier time and are continued by inheritance. The foresters are appointed by the corporation in the same way as in private forests.

Various charitable institutions in Thuringia have also possessions in forest land which were for the most part allotted to them by the state or by private owners as a means of maintenance. Among the institutions having such possessions may be named: Poor-houses, asylums for the deaf and dumb, infirmaries for the aged and sick, &c.

The following table shows the total area in woodland in Thuringia, and the proportion of woodland belonging to each of the states and to communities, corporations, private individuals, &c:

States.	Total area in acres.	Per cent. under forest.	Area in acres under forest.
Saxe-Meiningen.....	608,954	41.8	254,581
Saxe-Altenburg.....	327,034	27.6	90,565
Saxe-Coburg-Gotha.....	481,465	30.1	145,126
Saxe-Weimar.....	892,018	25.8	230,263
Schwarzburg-Sondershausen.....	213,047	30.1	64,190
Schwarzburg-Rudolstadt.....	232,380	43.9	102,156
Reuss jüngere Linie.....	203,854	34.9	76,839
Reuss ältere Linie.....	80,551	37.6	28,177
Total.....	3,039,303	38.6	991,899

The following table shows the area of the entire surface of the countries mentioned and the percentage of total area of each under forest :

States.	State forests. in acres.	Per cent. of total area.	Community forests.	Per cent.	Forests belonging to institutions.	Per cent.	Forests belonging to corporations.	Per cent.	Private forests.	Per cent.
Saxe-Meiningen.....	103,668	40.6	58,024	22.7	1,949	0.8	21,167	8.6	69,773	27.3
Saxe-Altenburg.....	41,794	46.1	1,937	2.1	2,209	2.5	1,497	1.7	43,128	47.6
Saxe-Coburg-Gotha.....	93,539	64.4	15,821	10.9	543	0.4	9,224	6.4	25,999	17.9
Saxe-Weimar.....	107,570	46.7	37,470	16.3	3,536	1.5	11,548	5.0	70,141	30.5
Schwarzburg-Sonderhausen...	41,475	64.6	6,207	9.7	598	0.9	9,478	14.8	9,432	10.0
Schwarzburg-Rudolstadt.....	46,644	45.7	10,674	10.4	1,235	1.2	2,073	2.0	41,530	40.7
Reuss jüngere Linie.....	39,625	51.5	1,439	1.9	1,754	2.3	225	0.3	33,796	44.0
Reuss ältere Linie.....	11,080	39.3	262	0.9	613	2.2	.....	.....	16,222	57.6

ORGANIZATION AND FUNCTIONS OF GOVERNMENT FOREST BUREAUS.

For the information under this head as well as the various matters submitted in this report I am particularly indebted to Mr. Hermann Benz, an efficient officer of the forest department of Sonneberg. The said gentleman, having been in continual service in this department for the last ten years, and being a graduate of the forest academy at Eisenach, Thuringia, may be considered a good authority on the subject of forestry in Thuringia.

The ducal state ministry, department of finance, has exclusive control of both the financial and general management of the domain forests in the duchy.

The functions as counselor and referee in this department are assigned to the technical chief of the bureau for "forest appraisement and revision."

The duties in this officer are, in particular, to superintend the management and cultivation of the government forests and attend to all technical and personal matters in relation thereto, and the officers in charge. He examines and adjusts accounts and must sign all vouchers. He recommends for promotion officers whom he considers worthy of it, and regulates the rates of salaries according to the prescribed order.

Immediately subordinate to the department of finance is the bureau for forest appraisement and revision.

The officials for this bureau are composed of a director or technical chief, who, as above stated, also performs the duties as counselor of the department of finance, one appraiser and two assistants. These officers are charged with the preparation of any or all new regulations that may be suggested by the department with regard to the management of the forests; they must also prepare the preliminary reports for the decennial revisions and execute all surveys relating to woodlands that may be brought before them.

The duchy of Saxe-Meiningen is divided into four forest districts, each district forming a distinct department which is presided over by a superior

officer called "forestmaster." The duties of the forest departments in general are to superintend the managements of forests and hunting, within their own districts in particular; to examine, report on and submit to the department of finance the annual plans of management prepared by the different forest offices under their jurisdiction; to see that these plans are strictly and punctually carried out, to direct the sale of forest products, to control the receipts and expenditures and take under their charge all persons employed in the management of forests within their districts.

Next in order are the forest offices. These offices have charge of the cultivation and preservation of the forests and all matters pertaining to the chase. They are required to prepare and submit to the forest department each year plans of management covering all matters relative to the woods, which, after they have been approved by the department of finance, they must carry into practical effect. They have to dispose of the forest products, when especially authorized by the department, must keep a register of the receipts and expenditures, as well as a complete record of all transactions in connection with the woods under their control, and have under their charge and surveillance all persons employed for the protection and cultivation of these woodlands and all other purposes.

The forest office renders its accounts quarterly and transmits them with an accompanying extract from the books, showing a minute account of the receipts and disbursements to the department for examination. This department forwards the accounts, if correct, to the department of finance, with the recommendation that they may be allowed. This rule is to be observed in nearly all matters of business submitted to the department by the forest office. These matters are first referred to the department of finance for approval before they can be carried out and thereby often needlessly delayed. The forest officers as indicated do not communicate with the department of finance directly. There has been set forth strong opposition of late to this course of business. The foresters desire that there be direct connection between the forest office and the department of finance and the district department act only as an inspection office. At present it is an office of management and inspection combined.

This new system, as indicated by the forest officers in this duchy, has already been to some extent adopted in larger states, for instance, in Prussia Bavaria, &c., and is likely to be introduced here shortly.

SOURCE OF LUMBER SUPPLY.

The consumption of lumber here, owing to the numerous factories and industrial establishments, which may be found in every direction, especially in this section of Thuringia, is quite considerable.

The capacity of the Thuringian forests, state communal and private combined, with their almost inexhaustible wood production, would be sufficiently large to meet the entire home demand, since a good deal of lumber is exported from here every year, of which some goes to the cities and districts on the

Rhine, while the largest quantity, particularly the better class of timbers, is shipped to Holland and is there used for shipbuilding.

But competition also enters more or less into the Thuringian wood trade and therefore a good portion of the home demand is supplied by foreign countries, namely, Austria and Hungary, Sweden and Denmark.

The import duties in Germany, according to the revised tariff from May, 1885, on timber and stock-woods, with or without the bark, are 20 pfennigs (4.8 cents) per 100 kilometers, or 1.20 marks (28.6 cents) per festmeter (cubic meter of solid wood).

REVENUE FROM GOVERNMENT FORESTS, COST OF MAINTAINING AND MANAGING
FORESTS—PROFITS OF FOREST CULTURE.

I submit the following table in order to show the average pecuniary profits of forest culture in the duchy of Saxe-Meiningen. There is little doubt that the results exhibited in this instance would correspond very nearly with those which the return of the other states would show. This table, showing the annual income, the expenditure and the net profits in connection with the 103,668 acres of wood land owned and managed by the government of Meiningen, is made up from official sources, and the estimations are based on the receipts of former years and on what is so far known of the product of the forests for the current year:

REVENUES FROM THE GOVERNMENT FOREST AND HUNTING IN THE DUCHY
OF SAXE-MEININGEN.

Estimated receipts for the year 1887.

Wood: 187,028 fm. (cub. met. solid wood) average price \$2.19 $\frac{9}{10}$	\$411,274.00
Other sources.....	1,666.00
Hunting	809.00
Total.....	<u>413,749.00</u>

Estimated expenditures for the same period.

Salaries of principal officers:	
4 forestmasters (average per annum, \$1,071)	\$4,284.00
39 overforesters (average per annum, \$571.20).....	22,276.80
13 foresters (average per annum, \$362.95).....	4,718.35
Salaries of subordinates:	
21 assistant and candidate foresters (average per annum, \$219.41).....	4,607.68
Salaries of other employés:	
78 rangers, employed permanently, \$139.62.....	10,890.88
37 rangers, employed temporarily, \$92.88.....	3,436.72
Salaries of incidental help.....	190.40
Salaries of office messengers.....	142.80
Rent and miscellaneous expenses:	
Rent allowances to assistant officers entitled to free lodging, to whom rooms in the government buildings cannot be furnished,.....	333.20
Department office expenses:	
Salaries of department chiefs.....	1,610.54
Postage	319.86

Department office expenses—Continued:

Stationery and incidentals.....	\$283.00
Traveling expenses, keeping of horses for the service, and other expenses...	4,284.00
Forest administration:	
Salary of the chief counsellor to forest board.....	571.20
Bureau of appraisement:	
Salaries, remunerations, rents, traveling expenses, books, stationery, &c.....	2,450.21
Surveyors' fees	238.00
Boundary stones and for establishing boundary lines.....	238.00
Cultivation of the forest.....	11,662.00
Labor in forest: felling of wood, splitting and cording.....	74,732.00
Building and maintaining forest roads.....	13,566.00
Tools and implements.....	190.40
Loss by wood gratuities and discounts on price of wood furnished under certain privileges	3,748.50
Aid to students at the forest academy.....	83.30
Incidental expenses	702.56
Loss in rent for hunting grounds.....	47.60
Total.....	<u>165,608.00</u>

Recapitulation.

Receipts.....	\$413,749.00
Expenditures	<u>165,608.00</u>
Net profit for the year.....	248,141.00

These figures show an annual net income of \$248,141, or about \$2.38 per acre. Upon the first glance at this exhibit it may be concluded that the net income per acre is not very large.

The revenue, of course, could be easily increased if it was thought expedient to fell a larger amount of timber than a scientific management of the woods would justify. But here the result is considered perfectly satisfactory, and experience has proved that a result so favorable as this could only be obtained by the exercise of vigilant foresight, prudence and skill in the management and cultivation of the woods.

FOREST PLANTING AND CULTURE—METHODS, BOUNTIES.

Part of the information on this subject I obtained through the kindness of Overforester Carl Mueller, of Coburg, a venerable and friendly gentleman, who has been engaged as a state forester since 1839, and his remarks are herewith submitted in the plain and abridged language in which they were given.

The clearing of forests is usually done by sections, *i. e.*, a certain section of forest is entirely cut away, while the young trees of natural growth remain standing. There is often enough new wood to pretty nearly fill the places of the trees removed. If this is not the case then recourse is to be had to seeds or to transplanting young trees from the nurseries into the vacant spots. Sometimes it also occurs that tracts of wood land that have been cleared are allowed to lie fallow for a time in order to aid the productiveness

of the soil and to destroy the insects. This method is looked upon favorably by many of the foresters, having, in most cases, proved a success (in that direction).

All forests that are cleared off must be replanted. Entire or partial deforestation for the purpose of devoting the ground to any other purposes than those of wood-growing is prohibited. Exceptions in this regard may only take place under the sanction of the ducal minister of the interior.

Clearing and replanting after eighty to one hundred and twenty years' growth is called "high clearing system" (*hochwaldbetrieb*); this method of clearing having for its object to secure the most perfect and valuable crop of wood upon a given piece of ground, and to bring the money proceeds therefrom as high as possible.

The *niederwaldbetrieb*, or "low clearing system," is that in which the felling of the trees takes place after a growth of from but 15 to 30 years.

Oaks, especially when the tender bark is desired for tanning purposes, are sometimes cut at the age of from 12 to 15 years. The *niederwald* produces itself from the natural growth of shoots springing up from the remaining stumps and the roots of trees, while the *mittelwaldbetrieb*, or "medium clearing system," differs from the former, inasmuch as this course of clearing is only adopted to get rid of the deciduous trees and to thin out thickly-wooded tracts to further the general growth of the trees.

With reference to the planting of young trees Overforester Miller says that he had charge of a tract of woodland, embracing about 6,600 acres, where he set out many thousands of young trees each year. After these trees are planted there is almost nothing more to be done. The trees were all raised in the nurseries from seeds, having been transplanted there when two years old, and were planted in the forest after a five years' growth in the nursery.

These nurseries are usually located on forest ground; are maintained by the state, and receive the most careful attention. The surplus production of young plants the forester endeavors to dispose of at merely nominal prices to cover the expense of raising.

The demand for them is only limited, as corporations and private owners of woodlands usually raise their own crops. The possessors of private forests are given the young trees free if they agree to plant lands hitherto under cultivation with wood.

This, to my knowledge, is the only encouragement offered in relation to forest planting in Thuringia, and it might perhaps be termed a "bounty."

FOREST SCHOOLS—THEIR ORGANIZATION AND COURSES OF STUDY.

The schools in which the young forester—after he has acquired the necessary preliminary knowledge in a high school, polytechnic institution, gymnasium, &c.—receives his academical training are in Germany partly independent institutions; as for instance, the forest academies in Neustadt, Eberswalde, Muenden, Tharandt, Aschaffenburg and Eisenach, partly united with universities, as in Muenchen, Giessen and Tuebingen.

For a better understanding of what is taught in the forest academies it is required that the person expecting to devote himself to forestry should first pass through a course of practical study at some forest office under the direction of the overforester. In the Thuringian states one year of such study is indispensable if the person intends to enter the service of the State. This period of study is called the *élève*, or voluntary year.

In the forest academies there prevails, as in the universities, perfect freedom of study, with the exception that those students preparing themselves for the state service, must attend the academy under the control of the respective states from which they seek appointment, and are also bound to study all the branches taught.

The courses of study usually are as follows :

Chairs.	{ Three instructors..... One instructor..... One instructor..... Two instructors..... One instructor..... One instructor..... One instructor..... }	Subject of instruction.	{ Forest culture in general. Jurisprudence. Political economy. Mathematics and geodesy. Physics and chemistry. Mineralogy and geognosy. Botany and zoölogy of forestry.

Moreover, an academy must necessarily possess extensive collections in geodetic and scientific objects, and also a tract of woodland into which excursions may be made by the students from time to time for the purpose of lectures and practical demonstrations.

For the Thuringian states, *i. e.*, for the grand duchy of Saxe-Weimar-Eisenach, the duchies of Saxe-Meiningen and Anhalt, the principalities of Schwarzburg, Rudolstadt, Sondershausen, the forest academy of Eisenach is established by law.

This school was established as long ago as 1808, and was first carried on by a private gentleman; but in 1830 it was raised by the grand duke of Saxe-Weimar to the rank of a government institution, and since that date it has been conducted under the direction of the state.

The course at this school is two years. At the close of each semester a brief examination is held, which all the students who think of entering the service of the state are bound to stand. After the expiration of the four semesters the principal examination takes place, the so-called *tentamen* (test examination). At this examination, which is held in the presence of state officials, opportunity is given to the students desiring appointment by the government, in writing and orally, to show how far their qualification answers the requirements of the law.

The decisions on the result of the examination and the composition submitted are laid before the ministries of the respective states whose subjects have attempted the examination, and they determine whether the examined is qualified for the state service or required to go through another semester for the purpose of a re-examination. If the student is deemed competent and acceptable he is then temporarily admitted into the service and receives

the title of candidate. As such he is granted a yearly remuneration in the Thuringian states, while in Prussia no such compensation is made. As a candidate the young forester enters what is termed the preparatory service. At the end of four years (in the duchy of Meiningen, in some other states only two years) the aspirant has to stand a second examination, mainly of a practical nature. The admission to this second examination depends upon the presentation of a larger composition on a theme pertaining to forestry, which has been given to the candidate beforehand, and which he must prepare independently and without any outside assistance. During the preparatory service opportunity is offered to the young forester to acquaint himself with the order of business as well as different forest districts. As a rule he is not kept longer than from one to two years in the same district, and is employed in mountainous regions as well as upon level and hilly woodlands. Although the second examination is more for the purpose of ascertaining how far the candidate has during the preparatory service improved himself in practice, and how far he has acquired the necessary qualifications for a future administrative service, yet it also touches upon the auxiliary subjects of the science of forestry, and particularly the laws of the land where he is to be employed. After passing this examination the candidate acquires the right to a definite position in the service of the state.

Thus there is in this country a trained body of men devoting all their energies to the advancement of the science of forestry.

The varieties of climate and soil in the United States certainly permit the growth of nearly every species of tree, and importations of many of the varieties most generally cultivated in Thuringia and elsewhere would doubtless be profitable.

A list of the principal trees which here flourish is herewith added, and is as follows: Oaks (*quercus pedunculata*), beech (*fagus sylvatica*), ash (*alnus glutinosa*), birches (*betula alba*), firs (*pinus sylvestris*), white pine (*pinus picea*), larch (*pinus larix*).

The pine family and beeches prove the most profitable here.

In conclusion I add the names of three sellers of forest seeds and shoots in this district, viz.: Messrs. J. M. Helm's Söhne, in Grosstabarz; Gebrüder Büchner and Carl Cropp, both in Erfurt, Thuringen.

OSCAR BISCHOFF,
Consul.

UNITED STATES CONSULATE,
SONNEBERG, March 31, 1887.

GENERAL LAW ON THE REGULATION AND MANAGEMENT OF THE FORESTS IN THE DUCHY OF SAXE-MEININGEN.*

SECTION I.

ORDINANCES FOR THE MANAGEMENT OF FORESTS.—CONCERNING THE DOMAIN WOODS.

ARTICLE 1. The management of the domain woods shall always be carried on with reference to keeping the forests in continual use as the chief object; and, to this end, the plan of cultivation must constantly have in view the aim of a careful average profit.

ART. 2. The purpose shall be to obtain the highest possible amount of wood products, with due regard to the particular kinds of growth.

ART. 3. The auxiliary products of the woods must always be kept in subordination to the chief object, in order that an excessive prosecution of incidental advantages may not effect the yield of timber.

CONCERNING THE FORESTS OF COMMUNITIES, CORPORATIONS, CHURCHES AND CHARITABLE INSTITUTIONS.

ART. 4. The cultivation and management of forests belonging to communities, corporations, churches, and charitable institutions shall be carried on under the supervision of the state government.

ART. 5. Such forests must be surveyed, mapped and described by an expert at the expense of the owners, so far as proper maps of the same are not already on file; and, in regard to the cultivation of said forests, plans must be produced for the approval of the authorities, showing that the management of the forests is to be conducted with due reference to a careful profit. These plans of cultivation must insure the continued usefulness of the woodlands.

The choice of an expert or competent person to make such plans shall be left to the owners or their representatives; but the forest department shall examine these plans to approve or reject them. From these plans, made as before mentioned, the forest department alone shall decide if woodlands, which are classed as incapable of regular cultivation, shall be diverted to other uses.

ART. 6. To carry on the plan of cultivation according to the approved arrangement, the owners may, either alone or in connection with other wood-owners, appoint a common forester, paying the same wages, according to terms which may be mutually agreed upon; or, if they prefer, they may engage the services of one of the ducal foresters at an agreed upon rate of compensation. Either arrangement requires the sanction of the ducal state government.

ART. 7. The owners of wood lands shall be held responsible for the administration and management of the same, and shall be required to appoint the necessary forest rangers. Persons appointed to this office must be approved and empowered to act by the chief forester of the district, as well as receive the endorsement of the authorities of the respective corporation, &c., within whose jurisdiction they may exercise their function.

ART. 8. Should wood-owners neglect to secure the services of an expert, (article 5), or fail to select a forester to manage and administer their property (articles 6 and 7) within three months after due notice has been given, then the forest department shall provide the same and carry on the management for the account of the owners, who shall be held responsible for all loss which may have accrued in consequence of their neglect. Such losses shall be clearly set forth in the statement of claims for damages.

ART. 9. The cost of carrying on the management and the administration of the forest rangers shall be borne by the wood-owners.

*This law may be taken as a type of all the statutes on the same subject which are in operation in the Thuringian States.

CONCERNING PRIVATE WOODS.

ART. 10. The owners of private wood lands shall keep them in a wooded condition under supervision of the state government, in compliance with the general regulation of section 1, article 4, and subject to all the provisions of section 1 and 2. By "a wooded condition" is understood that, when timber has been felled, the ground must not lie waste; but, as soon as possible, be replanted with another growth of woods.

ART. 11. The division of woods held in joint ownerships shall only take place with the sanction of the ducal state ministry, department of the interior, and this permission shall not be revoked, when the lands so divided shall be cultivated upon a regular plan and continue capable of such cultivation. Without such sanction of the state ministry, any division is declared to be illegal and of no effect.

GENERAL REGULATIONS.

ART. 12. The supervision by the state government, according to articles 4 and 10, of all the forest lands shall be made by the nearest forest office; and, in the more important cases, by the state ministry, department of the interior, under advisement of the collective ministry of the duchy. These officials shall take cognizance of all complaints made by the wood-owners against the subordinate officers of the forest department, who are charged with the management and superintendence of the forest, and shall decide the points at issue.

SECTION II.

FOREST RIGHTS AND CLAIMANTS' ACTION FOR DAMAGES.

ART. 13. Persons claiming any forest rights or privileges are bound to observe strictly the forest police regulations of the present law, the orders in support of the same, which may be issued by the ducal state ministry, department of the interior, or the ducal forest officers. Forest rangers and managers are charged to see that the law and the regulations are not violated.

ART. 14. No claims on the score of forest rights shall hinder the wood-owner from carrying out the plan of continual cultivation, so far as such claims may conflict with the management of the woods in this regard, and in their relations to soil and climate.

ART. 15. Claims for forest rights and privileges which shall interfere with the continued cultivation of the woods in accordance with the plans approved by the respective forest offices, shall, upon the proposition of the wood-owner, be considered by the overforester, who is empowered to adjust and decide the same. Where several persons have claims of the same kind upon the same piece of woods, the wood-owner shall only make an appeal for the regulation of such claims against the claimants collectively. Claims for damages on the part of holders of rights and privileges against the owners of forest lands shall only be entertained when the diminution of such rights and privileges is the direct result of the discontinuance of the prescribed plan of cultivation, or of mismanagement on the part of the present or former owner of the woods, or when the enjoyment of such rights and privileges has been secured by contract.

ART. 16. If a claimant to forest rights shall protest against the changing of the species of wood or the method of managing the forest, the ducal forest offices shall decide the point whether, on the grounds of forest culture, the proposed change shall be necessary. If the forest office shall determine that such change is required, then the claimant to forest rights must consent thereto, and shall receive for the rights of which he has thus been deprived a proper indemnification. This indemnity shall be, so far as the circumstances will allow, the exchange of the former rights into others of similar value; and if this is not possible, a money compensation shall be made.

ART. 17. The wood-owner, as well as the forest-right claimant, is entitled to seek at the hands of the forest office the adjustment of all vague and doubtful claims, excepting only uncertain claims on the score of rights to building material.

ART. 18. With regard to the right to timber for building material, the claimant must first prove the need of such timber, and afterward its real employment for the purpose for which it was obtained. In case that a claimant to timber rights shall obtain the building material which he has demanded, the same must be applied within two years of the date of its delivery to the purpose for which it was delivered, and in no case may be otherwise used. Violators of this regulation will not only incur the punishment attaching thereto, but will be compelled to return to the owner of the timber the full value of the same. This value is to be determined by the forest office and to be computed from the time of the delivery of said timber.

ART. 19. Any wood or wood productions which may be given to officials of the government for their own use, by virtue of their office, shall in no case be disposed of or diverted from the original purpose, under the penalty made and provided for offenses of this nature.

ART. 20. New claims to forest rights cannot be established after the day of publication of this law.

SECTION III.

FOREST POLICE REGULATIONS.

ART. 21. The boundaries of every wood must, under the acknowledgment of the respective owners, be designated with properly marked boundary signs, which must be kept in good condition. For this purpose one of the owners, in behalf of the others, shall, from time to time, go over the ground, examine the boundary-marks, and at once cause to be repainted all those upon which the sign has become illegible, and cause to be replaced those that have been removed. These boundary-marks or signs are to be kept free from growing plants, and shall, as far as possible, be set so close together that one shall be visible from the other. Trees which may spring up on the boundary line are, at the direction of the forest office, to be removed by the owners of the adjoining lands at their common cost, and the wood shall be equally divided between them. Keeping the boundary-marks in good condition cannot be neglected by any owner, and the cost must be borne in common.

ART. 22. If it be necessary to carry away any wood product over a neighbor's land, or to store wood thereon, the forest office must seek to make an agreement between the respective owners; but failing in this shall itself make terms with which the parties must comply. The wood-owner, in case he is not bound to yield the use of his land gratuitously, has the right to proper compensation for any damage to his ground and trees.

ART. 23. Entire or partial deforestation, for the purpose of devoting the ground to any other purposes than those of wood-growing, is prohibited. Exceptions in this regard may only take place under the sanction of the ducal minister of the interior.

ART. 24. Whoever, under the authority of the ducal minister of the interior, shall uproot a piece of woods, shall be required to use the ground for the purpose alone for which the removal of the trees was permitted. In order that the prescribed plan of cultivation may not be interrupted, the approval of the felling must be confined to a special time, within which period the removal of the trees must take place.

ART. 25. Naked grounds which are capable of growing woods must be planted; and, after the trees have been felled in any place, should a spontaneous regrowth not occur, the ground must be sown and cultivated. In carrying out this prescribed culture the forest office shall fix a certain time in which the same shall be prosecuted; and if at the expiration of this period, nothing has been achieved, the forest office itself shall undertake the work, at the cost of the delinquent, who shall also be liable to the prescribed punishment for his neglect.

ART. 26. Those lands, which in future shall be diverted from other purposes to forest growth, shall likewise be subject to the same regulations which the law applies to the woods now in existence. However, the owner of such lands shall be bound first to cancel all claims upon them for rights to pasturage (in accordance with the provisions of the law of May 5, 1850, article 61, relating to the liquidation of encumbrances on the soil), before such diversion to the growth of forest shall take place. Should a private wood-owner, in the same way,

either before or after the passage of this law, wish, on economical grounds, to restore the piece of land again to the purposes of a field, meadow or garden, no forest police authority is necessary in the premises. It will only be required that the same rate of taxes shall be paid.

ART. 27. Pasturage in the woods can only be had by permission, and under the supervision of one or more herdsmen. The claimant of a right to pasturage is also bound to follow the instructions of the foresters in regard to the places where he may exercise his right. In driving cattle to pasture it is prohibited to take them through young growths of wood or any other places where they may do injury to the plantations. Wood pasturage is in no case to be permitted before sunrise or after sunset.

ART. 28. Herdsmen who shall repeatedly transgress the regulations in reference to wood pasturage within one year must, on the proposition of the forest officials or the wood-owners, in addition to the punishment incurred by the offense, be dismissed from the service of their employers. So soon as this proposition has been made the forest officials may prohibit the herdsmen from further herding in the woods.

ART. 29. Grazing in the woods shall only take place by permission of the forest officials; and then only where it may be safely allowed without injury of any sort.

ART. 30. For the use of moss, leaves and litter the authority of the forest officials must first be obtained, and this can only be granted where the collection of these materials will work no harm to the growth. In the gathering of leaves and moss a wooden rake may only be used. The use of iron rakes, shovels and hoes, and also brooms, for this purpose, is prohibited. In cutting broom and heath the cutting instruments that are used must first be shown to the forest officials for their approval.

ART. 31. The use of axes or any other cutting tools in the gathering of dry or fallen wood, as well as of any kind of cart to carry away the same, is prohibited, unless particular permission to use the same has first been obtained from the forest officials. The time for cutting and collecting fallen wood shall be appointed by the forest offices. For gathering windfallen wood, as a rule, the forest offices shall fix two days in each week; but in extraordinary cases where the windfall has been uncommonly large, the time of gathering the same may be extended to more than two days, at the discretion of the forest offices. To procure firewood from the supply kept in the districts of Sonneberg and Eisfeld, four days in each week shall be appointed by the respective forest offices in which the wood may be delivered; but if a fewer number of days shall be found sufficient, the time shall be reduced and fixed accordingly.

ART. 32. The preparation and working over of building material in the wood is prohibited, and may only be allowed in exceptional cases of pressing necessity by the forest offices.

ART. 33. If there shall occur in any forest district repeated theft of timber, the ducal state minister, department of the interior, shall publicly order and proclaim that, during a certain period, all the productions of wood of the district within which the offense has been committed, as well as of the district in which the stolen wood has been sold or otherwise disposed of, shall be exhibited by the seller to the authorities of his dwelling place, on days fixed for such purpose, and no wood or wood productions shall be sold in said districts without a certificate from the said authorities showing the sort, size, number, or measure of the timber, &c., which certificate must first be delivered to the police officials of said district.

ART. 34. In opening the ground to search for veins of minerals or fossils, care must be taken, as far as possible, to do no injury to the forest growth. Before the digging or trenching is begun the miner must show the written authority from the mining department to the forest officials or wood-owners under which he is about to proceed, that the latter may fully understand the precise place where the digging is to be done. No mining operations shall begin before the compensation which the wood-owner is to receive for diverting his wood land to mining purposes has been fully determined. In every case abandoned openings shall be filled in again by the person who has opened them.

ART. 35. Making of fires in the woods, or within a distance of 150 paces from the same, may only take place by a strict compliance with the regulations for protecting the forest from

burning. In seasons of particularly dry or very stormy weather the making of fires is absolutely prohibited. Whoever shall make a fire is bound to quench the same entirely before leaving the vicinity.

ART. 36. Before charcoal-burning in the woods is begun, in every case notice must first be given to the forest officials (and this applies to the owners of private woods also) whose special regulations must be awaited, and carefully followed by the workmen. The regulations of article 35 also apply to the business of charcoal-burning. Persons who may do damage to the woods or to the chase, or whose presence in the forest otherwise causes injury, are to be excluded by the forest officials or wood-owners from the charcoal-pits.

ART. 37. If buildings shall be erected within the woods, or within 300 paces of the same, where business is carried on involving risk of fire, the sanction of the police must previously be obtained, and this sanction must always be reported to the forest office. Without this police sanction every building, or annex thereto, shall be removed at the requisition of the forest office, and the expense of removal shall be borne by the builder, in addition to the other punishment which is incurred by his offense.

ART. 38. In case a fire shall break out in the woods, the inhabitants of the neighboring villages or communities are bound to render aid immediately to extinguish the flames.

ART. 39. Should signs or traces of injurious insects appear in the woods, the regulations for extirpating such insects and protecting the growth which have been established by the forest office, shall be followed without delay. Hardships or annoyances resulting from such regulations will not be considered. If the regulations shall not be followed, the forest office shall itself direct the work to be done at the expense of the delinquent, who shall also be liable in addition to the penalty incurred by his failure.

ART. 40. The carrying away of timber, &c., as well as felling and preparation of wood and other work in the forest, with the exception of charcoal-burning, shall take place only between sunrise and sunset. But the forest officials are, nevertheless, empowered to modify this regulation so far as concerns the hauling away of timber in special cases.

ART. 41. Whoever shall undertake to uproot a piece of woods (article 23) without the permission of the police authorities of the forest, will be liable to a fine of not less than one-quarter of the value of the wood so uprooted, and of not more than the full value of the same. In such a case the ducal forest office is required to compel the replanting of the woods within a specified time; and in the event of failure on the part of the owner to comply, the replanting shall be done by the forest officers and the expenses of the work shall be assessed upon the owner.

ART. 42. Violations or neglect of the ordinances laid down in articles 21, 22, 24, 25, 26, 27, 28, 29, 30, 31, 32, 34, 35, 36, 37, 38, 39, and 40, and the regulations of the forest offices and officials in support of the same, will be punished in accordance with the penalties affixed by the forest laws to such offenses; and, if such violations and neglect are not provided against by said laws, a fine from 1 gulden to 50 guldens may be imposed, or arrest and imprisonment at hard labor in default of payment.

ART. 43. Unauthorized interference in the business of the technical management of the officials who are in control of the woods belonging to communities, corporations, churches, and institutions will be punished at the decision of the forest offices by a fine of from 1 gulden to 25 guldens, or in default of payment to imprisonment.

ART. 44. The ducal state ministry, department of the interior, is charged with the execution of article 4, &c., of this law.

The present law shall go into operation on the day of the publication thereof.

All laws conflicting with this law are hereby repealed.

Witnessed under our own hands and signatures and given under the seal of the Duchy of Saxe-Meiningen on the 29th day of May, 1856.

BERNARD ERICH FREUND.

HARBON E. HOSSFELD.

DR. OBERLANDER.

F. V. UTTENHOFEN.

The following additional enactments bearing a later date may be added. They may be of interest since they show the causes for which one may be deemed guilty of trespass in the forests and give the penal regulations now in vogue in this duchy:

DECREE OF THE DUCAL MINISTRY OF STATE, DEPARTMENT OF THE INTERIOR, MARCH 12, 1863.

CONCERNING THE REMOVING OF WOOD AND OTHER FOREST PRODUCTS FROM THE DOMAIN FORESTS IN THE DUCHY OF SAXE-MEININGEN.

In the interest of forest protection and order in the forests, on the ground of article 16 of the penal law on forests of June 23, 1850, with the approval of his highness, the duke, the following forest police regulations have been established:

ART. 1. All timbers in the domain forests which are to be removed and other forest products may only be taken from the forest by the buyers or other receivers —

- (1) When the forest office has given permission in writing; and
- (2) As to timber and round wood not before the forest officers shall have marked each piece with a stamp. The wagoner, as he removes the wood, shall carry the written permission (under 1) with him and shall show it to the forest or the police officers when desired.

ART. 2. The receivers of the forest products are bound, in observation of the regulations of article 1, to remove these products out of the domain forests within the time specified by the forest office.

ART. 3. Opposition to the regulations of this decree will be punished by a fine of not over 15 marks, or corresponding imprisonment at hard labor in default of payment. These fines may be proportionately increased, respectively doubled, on a second offense, as well as for not observing a second grant of time for the removal of the forest products after the expiration of the first grant.

ART. 4. When the forest office orders the clearing of the forest of products having been disposed of, as a measure of security against injurious insects, the regulations of article 39 of the forest laws of May 29, 1856, are applicable.

GISECKE.

LAWS OF DECEMBER, 23, 1874.

REFERRING TO THE PUNISHMENT FOR INFRINGEMENT OF THE FOREST LAWS, AS WELL AS TRESPASS AGAINST THE FOREST AND FIELD POLICE REGULATIONS.

We, George, by the grace of God, duke of Saxe-Meiningen, with reference to the necessity of a change in the penalties of the law of Dec. 23, 1870, on punishment for infringement of the forest laws, which the introduction of the calculation in marks has caused, as well as trespass against the forest and field police regulations, have in accordance with this caused this law to be remodded and do with agreement of the chamber of deputies ordain the following:

SECTION I.

ON PILFERING IN FORESTS.

ART. 1. Whoever purloins wood, gum from the trees, bark, grass, litter of any kind or other products, which belong in any way to the forests, from woodlands or places under the forest regulation shall be deemed guilty of pilfering the forests.

ART. 2. Under pilfering of the forests is also understood the stealing of felled timber, even such, which has already been transferred or delivered, as long as the same lies in the original piles, either on forest lands or on land bordering immediately on the forest, beyond the custody of a building or of any inclosures adjoining the same; and as to living wood, a mere damaging of trees is considered the same as theft, (article 1) if their growth is thereby checked.

ART. 3. Forest thefts shall be considered as committed as soon as the thief has taken the object into his possession, or, as to living wood, as soon as it has been damaged in the manner described in article 2. Gum from the trees, moss, grass, leaves and other litter especially, shall be considered to be stolen when they have been scratched off, cut off, torn off or raked together by the accused.

ART. 4. If the owner of the forest has sustained injury outside of the value of that which has been stolen, especially by stripping off the leaves, breaking or cutting off the tops of trees, particularly for the use of May-poles, Christmas-trees, for wagon-tongues and side-ladders, whip-stocks, canes, rake-handles, hoops, bean-poles and the like, by cutting the resinous wood out of standing trees, tearing off the bark to get sap from the trees by peeling off the outer or inner bark, uprooting standing trees, cutting off switches or branches for brooms, prohibited tapping of birches and maples, pulling up tree-seedlings by the roots, &c., the worth of the stolen objects (with the exception of the cases provided for in article 7, under 1 *d* and 2 *d*, which are punished by the penalties mentioned there and in article 11) is to be computed with the amount of the damage, and the sum of both shall be considered as the total amount of the theft, and the penalty shall be adjudged in accordance therewith.

ART. 5. For smaller thefts, *i. e.*, those in which the amount does not exceed 15 marks, the special regulations are given in articles 6 to 10.

ART. 6. Forest thefts shall be punished as follows:

- a. For thefts not exceeding 40 pfennigs (about 10 cents), from half a day to a day's imprisonment.
- b. For thefts amounting to from 40 to 80 pfennigs, from one to two days' imprisonment.
- c. For thefts amounting to from 80 pfennigs to 1 mark and 50 pfennigs, from two to four days' imprisonment.
- d. For thefts amounting to from 1 to 3 marks (23.8 cents, to 67.4 cents) from four to six days' imprisonment.
- e. For thefts amounting to from 3 to 6 marks, from six to ten days' imprisonment.
- f. For thefts amounting to from 6 to 9 marks, from ten to fourteen days' imprisonment.
- g. For thefts amounting to from 9 to 15 marks, from fourteen days to four weeks' imprisonment.

As grounds of lessening the fine, not only the restitution, which may have been made, but also the weather and all other circumstances may be taken into account.

ART. 7. The duration of the imprisonments threatened in article 6 may, by decision of the court, be increased—

1. To one and a half times the single fine:

- a. If the accused in the act of committing the theft used a saw or an iron rake in stealing wood, forest litter, &c.
- b. If the theft was committed on Sunday, holiday or repentance day.
- c. If felled trees were stolen.
- d. If acorns or beech-nuts or other kinds of leaved wood, or pine-tree cones were stolen out of an enclosed lot or nursery.
- e. If the thief, provided he was caught in the act by the owner or person charged with the oversight of the forest, did not stop at his command or gave a false name, or otherwise tried to make himself unknown.

f. If three or several persons agreed to commit the same theft at the same time and place and carried the same into effect.

2. To twice the single fine:

- a. If the theft was committed before sunrise or after sunset or when the objects stolen have been taken into custody.
- b. If the thief used a team to haul off what he had stolen.
- c. If the thief stole the said objects to sell them or to be worked into articles for sale.
- d. If the theft consisted of grafts, trees planted along forest roads or nursery trees.
- e. If the thief has been imprisoned for forest theft during the previous year.

f. If the thief carried arms or other dangerous instruments not necessary for committing the theft.

If several of these cases occur in the same theft only that one is to be taken into account to which the highest penalty is attached.

ART. 8. Instead of the imprisonments determined by the two foregoing articles, corresponding fines may be imposed. One day's imprisonment is hereby declared to be equal to from 1 to 9 marks. The same relations shall hold good for changing fines into imprisonment.

ART. 9. When several small thefts occur together the punishment is to be determined upon the total amount.

ART. 10. Prosecutions for smaller forest thefts becomes void in six months; the executions of the punishment for the same become void in a year. The time for the limit of the execution begins at the expiration of the ten days respite after the knowledge of it, and also if the accused has not appeared at the trial.

ART. 11. Forest thefts the amount of which either for one or several thefts does not exceed 15 marks, shall be punished by fourteen days' to two years' imprisonment and, in addition, the right of citizenship may be suspended. If the punishment does not exceed six weeks a fine corresponding to the regulations of article 8 may be imposed.

In determining the fine the aggravating circumstances mentioned in article 7 shall be taken into account; but as to the increase of fine on account of a previous punishment regulated under 2 e, it shall be sufficient ground for increasing the fine when the thief has been punished for forest theft within the last five years. The right of prosecution for one or several offenses, when the aggregate amount exceeds 15 marks, shall be void in three years.

ART. 12. The punishment for aiding in a forest theft without regard to the case mentioned in section 260 of the imperial penal code, may—if it was promised by the abettor before the act was committed—not be over two-thirds and in other cases not over one-third of the lawful fine for the crime itself. The judge may impose instead of imprisonment a fine, and the said fine is to be determined in accordance with the relationship of the two punishments, established in article 8.

ART. 13. In the place of the imprisonment, incurred for a forest theft, the judge may, in accordance with the prescription of section 5 of the law of December 22, 1870, containing the transition regulations on the introduction of the North-German penal code, punish persons, who earn their living by daily labor, with labor of the same duration as the imprisonment. In the same manner the judge may, in accordance with the same prescriptions, change the imposed fine instead, of imprisonment, into daily labor.

ART. 14. Every one guilty of a forest theft must, aside of the punishment fixed by law, restore to the owner what was taken or its worth and make good the damage done by the act. When several persons join together, each one is held responsible for all (*in solidum*).

The same rule stands also for the abettors or receivers of the stolen objects, but only so far as concerns the part received by them, for which they, with the other participants, stand security one for all and all for one.

ART. 15. If married women, children under parental care, foster-children or apprentices, without the knowledge and consent of their husbands, parents, guardians, masters, commit a forest theft and the stolen objects are used for the latter, the last-named persons are bound to make good the damage done. All persons who keep servants and also all house-owners, in case forest thefts are committed by their servants and lodgers without the knowledge and command of the former, to the extent that the stolen objects were used for them, are only bound to make good the damage, when it cannot be collected from the thieves themselves.

SECTION II.

ON THE REGULATIONS OF THE FOREST POLICE.

ART. 16. (1) Whoever is caught with tools to be used for felling, grubbing up or injuring trees in a wood not belonging to him, outside of a regular road, without permission, shall be fined 50 pennings.

- (2) Whoever, in like manner, is caught with a saw shall be fined 2 marks.
- (3) Whoever uses other tools than a wooden rake for raking up litter shall be fined 2 marks.
- (4) Whoever, without permission, herds horses or cattle in a wood not belonging to him shall be fined for each head—
 - a. When it was done at night, 1 mark.
 - b. When it was done in the day time, 50 pfennigs.
- (5) Whoever, in like manner, herds hogs or sheep shall be fined for each one—
 - a. If done at night, 40 pfennigs.
 - b. If done in the day time, 20 pfennigs.

In numbers 4 and 5 the fine under *a* shall not exceed 20 marks and under *b* 10 marks. If the act is done intentionally, or from negligence, the fines shall be doubled, so that they shall then be, respectively, 40 marks and 20 marks.

(6) Whoever, without permission, herds geese, according to the size of the drove, shall be fined from 50 pfennigs to 2 marks.

(7) Whoever herds goats in a wood not belonging to him, shall be fined for each one 2 marks, but the fine shall never exceed 20 marks.

(8) Whoever, having the right to herd, shall, without permission, drive in other people's stock with his own, shall be fined for each one according to the regulations under 4, 5, and 6.

(9) If one of the pasture-trespasses under numbers 4 to 8 has been committed by a shepherd, he alone shall be fined, provided that the owner of the stock is not guilty in the matter. But if the trespass was committed with the knowledge or the guilt of the owner, he shall be deemed guilty, and together with the shepherd, who is a partner of the trespass, shall be punished by an imprisonment of from one to eight days with or without labor, according to section 5 of the law of December 22, 1870.

(10) Whoever leaves a fire set by him, with permission, in or near to a wood without entirely putting it out, shall, as far as the penal law on arson does not take effect, be fined—

- a. In the months from November to March, inclusive, in the sum from 1 to 5 marks.
- b. In other months from 2 to 10 marks.

(11) Whoever runs a wheelbarrow in a wood not belonging to him on a private road without permission, and tears away or damages ditches for protection or draining, or throws down or carries away other protections, section numbers, corner-stones, &c., or commits other improprieties, shall, as far as the penal law on damage does not take effect, be fined from 50 pfennigs to 2 marks.

(12) Whoever drives with a wagon over places where young trees have been planted (nursery) shall, with the same exceptions as in number 11, be fined from 2 to 10 marks.

(13) Whoever drives with a wagon on a private road (with the exception of the aforesaid nurseries) shall be fined from 50 pfennigs to 2 marks.

(14) Whoever maliciously or wantonly, on standing or felled trees, cuts out or takes away wood-marks, numbers, or other designations, or in any other way makes them unrecognizable, shall, where a heavier fine cannot be imposed, be fined from 50 pfennigs to 4 marks.

(15) Whoever tears down wood corded, leaped, or piled up shall be fined from 50 pfennigs to 4 marks.

(16) Whoever, when he is prohibited from selling, does sell or otherwise dispose of wood received either free or at a nominal price for his own use, under special privileges dated from early times, shall, for each cord of wood so sold or disposed of, be fined from 10 to 20 marks.

In cases of repetition of the same offense within the next five years after being punished, he shall be fined from 12 to 30 marks.

For the second or further repetitions of the offense, the temporary withdrawal of privileges shall take effect as a punishment, but only on the person himself and for a period not exceeding five years, provided that this was threatened at the time of the first offense, which should always be the case.

(17) Whoever sells or grants to others wood privileges which he has only for his own use, shall be fined from 2 to 10 marks.

(18) Whoever, when he has permission to take dry wood in the forest, together with dry branches which may be broken off without damaging the trees, uses edged-tools to get the wood on wagons to haul it away, without the permission of the forest officer, or in any other way trespasses on the regulations above mentioned in time, kind, or amount, *e. g.*, gathers wood at night or on days not allowed, shall be punished by imprisonment of from one to four days.

(19) Whoever sells fallen wood, gathered by permission, shall be punished by imprisonment of from two to four days.

(20) Whoever, without first obtaining permission from the forest officer, or by trespassing on such permission in time, place, or amount, prepares building material or manufactures timber into articles in the forest, shall be fined from 1 to 20 marks.

(21) Whoever, in carrying out his permission to gather wood or make use of forests in any other way outside of the regulation given under 18 to 20, trespasses in any other way contrary to law, shall be fined from 1 to 5 marks.

(22) Whoever knowingly buys the articles prohibited under 16, 17, and 19, according to the value of the articles, shall be fined from 1 to 10 marks.

If a forest theft is considered a violation of the police regulations, it shall only be taken into account as an aggravating cause. If the theft is so small that the law on an aggravating cause does not take effect, the punishment may be suitably increased, but it shall not exceed the highest fine fixed in article 6.

ART. 17. Other misdemeanors, not here mentioned, against general or local prohibitions, which are for the protection and order on the forest or for furthering forest culture, especially trespasses against the forest regulations of May 29, 1856, shall be punished, in so far as especial fines do not come into effect according to the regulations under article 16, with a fine as high as 150 marks, imprisonment, or, for those who earn a living by daily labor, with labor for the same time as the imprisonment (section 5 of the law of December 22, 1870, containing transition regulations). If fines, labor, or imprisonment is threatened in the special penal regulations, the accused shall be punished by a fine not exceeding 150 marks or imprisonment, or, under the same conditions, labor (forest or public labor) of the same duration as the imprisonment (section 5 of the law of December 22, 1870).

ART. 18. When the aggravating causes, mentioned in article 7, under 1 *b*, 1 *c*, 1 *f*, or 2 *a*, take effect in any of the trespasses enumerated in articles 16 and 17, or when the perpetrator has been punished for a like offense within the previous year, the fine may be, according to the circumstances, increased, but shall not exceed double the amount; further, instead of the prescribed fine, imprisonment or labor, of the same duration as the imprisonment (section 5 of the law of December 22, 1870, containing transition regulations), may be imposed.

One day's imprisonment shall be considered equal to from 1 to 6 marks. If the fine is less than a mark, it shall at least be considered equal to half a day. According to the same rule, a fine not collectable shall be turned into imprisonment.

ART. 19. The right of prosecution under police regulations becomes void in the same way as for minor forest thefts (article 10).

ART. 20. Every person guilty of a forest theft must, in addition to paying the fine regulated by law, make good the damage done; whoever induces any other person to trespass against the police regulations, shall, in addition to the fine, be held good together with the perpetrator for all damages.

ART. 21. Taking away or damaging trees to hide from observation, thefts committed on the same, or committing trespass against the police regulations, but which happened in an accident (*e. g.*, teamsters whose wagons have been upset or broken), shall, as far as the provisions of section 54 of the imperial penal laws do not cover the case, only be exempt from punishment when the perpetrator has shown willingness to make it good by paying the cash amount of the damage to the owner or his agent, or to the nearest official, within three days.

SECTION III.

AS TO THE METHOD OF PROCEEDING IN FOREST TRESPASSES.—(1) THE INFORMATION, STOPPING, AND SEIZURE OF TRESPASSERS.

ART. 22. Persons in charge of forests, to whom the oversight of the forest is intrusted, whether of a public or private character, and all police officers are bound to watch closely for forest thefts and to make known the same.

ART. 23. If any one is caught in a trespass, those who have oversight of the forest, including the owner and whoever else has an interest in it, are authorized to stop the trespasser, to seize him, and if it be an unknown person to take him into custody.

ART. 24. If the trespasser is refractory, the possessor, or the person acting for him, as well as the officer on duty, are allowed to use all necessary power in their own defense. This power, however, may only be used under the conditions of self-defense. (Section 53, imperial penal laws.) Unnecessary provocations to make the trespasser refractory are forbidden and will be punished according to law.

ART. 25. If in forest thefts or in trespasses against the police regulations, established in article 16, under 1, 2, 3, 14, 18, and 20, and article 17, the tools used were taken from him at the time the deed was committed, shall be returned only after the trespasser has made the damage good, for which they shall be held as security.

If the money is not paid within four weeks the right to redeem said tools shall be forfeited.

(2) COMPETENCY OF COURTS AND PENAL PROCEEDINGS.

The provisions of the regulation of penal processes with the amendments and the following regulations shall determine the competency of the courts as well as penal proceedings in forest misdemeanors.

ART. 27. In thefts in which the punishment is according to choice, imprisonment or a corresponding fine, the accused may prevent further proceedings by making the damage good and paying the fine and costs, which shall be made known to him at the time of summons, provided that this be done before the expiration of the time allowed by law. After the expiration of this time the imprisonment, or labor, regulated by law, may not be changed into a fine by the choice of the accused.

ART. 28. In the punishments for forest trespasses, the court must determine according to law the damage to be paid (articles 14 and 20), as far as the person damaged has not given it into the hands of any one else, and in the cases, designated in article 16, section 16, shall at the same time threaten the withdrawal of all privileges.

ART. 29. In acts punishable by labor to be determined by the courts and falling under the present law (paragraph 5 of the law of December 22, 1870), containing transition regulations, at the introduction of the North-German penal code, takes effect, but the following is also to be taken into account:

a. The culprits sentenced to labor-punishment shall give security for the full performance of the same. Any labor, whether forest or common, shall be in accord with the physical ability of the culprit, and shall be done under the direction of the proper officials or other authorities.

b. Forest culprits shall not be entitled to support during the time they are engaged in such labor.

c. The culprits shall perform their labor in the same manner as it is usually performed by hired laborers, and ten working hours shall constitute a day.

d. The labor shall be performed in the forest, where the damage was done, for the benefit and at the consent of the owner of the wood, when the forest officers find it proper to do so.

e. If a culprit, under sentence of punishment by labor, absents himself without sufficient excuse, this shall be regarded as a refusal.

STETTIN.

REPORT OF CONSUL FAY.

In the Kingdom of Prussia the following areas are under forests:

	Hectares.
Government forests.....	2,469,187
Common forests	977,058
Forests donated to benevolent institutions	88,445
Corporation forests	237,005
Private forests.....	4,382,251
Total	8,153,946

Classed as follows:

	Hectares.
Coniferous trees	5,406,446
Foliaceous trees.....	2,747,500

To the foregoing number of hectares the provinces of my district contribute as follows:

		Hectares.
Pomerania.....	{ Foliaceous trees	165,528
	{ Coniferous trees	429,305
Total.....		594,833
East Prussia...	{ Foliaceous trees.....	135,332
	{ Coniferous trees.....	526,734
Total.....		662,060
West Prussia..	{ Foliaceous trees.....	73,022
	{ Coniferous trees.....	461,826
Total.....		534,848

Grand total for the three provinces 1,771,747 hectares.

In conformity with the general formation of the land in the before-mentioned provinces the forests in them are situated either on level or on hilly ground, and consequently the cultivation of the forests in regard to the felling and planting of trees is constant and uniform.

Because of the principally sandy condition of the soil, as proven by the above figures, the cultivation of coniferous trees is predominant, the forests of which, of considerable breadth, extend along the Baltic coasts and protect the inland country from the sea storms and the invasions of the sand. Therefore great care is taken to keep up the stock of trees along the coast in a dense and compact connection, and to make sure of a sufficient number of young trees before the matured trees are felled.

The privileges formerly allowed to the inhabitants of the villages and towns in the neighborhood of the forests of gathering dry wood and litter and of pasturing their stock in them, as likewise the rights of some churches and schools of receiving annually certain quantities of timber or wood free of all charges, have now everywhere been either purchased by or donated to the parties or institutions entitled to such privileges, because so long as these rights were allowed a sufficient protection of the forests and trees, as well as a rational forest cultivation, was a thing of impossibility.

Severe laws for the protection of forests have been passed. For instance, no person is allowed to enter a forest with an axe, saw or any other implement that could be used for cutting down trees, and the wanton, damaging or mutilation of trees and nurseries is considered and punished as a misdemeanor.

FOREST ADMINISTRATION.

The administration and management of the government forests is organized in the manner that, in the home department of state, there is a proper bureau for the forests of the whole kingdom, with divisions of administration for every province, each of which is directed by from two to five forest officers under the supervision of a chief forester. Each of these officers has the superintendence of from five to six districts, managed by an equal number of master foresters, which he must visit and control annually at least four times, after having given notice of his intended visit to the master forester, and once or twice without such notification.

Every master forester has under his special management an area of from 4,000 to 8,000 hectares. He must reside in his district, and has several assistants, which we will name underforesters. Each of these underforesters has the superintendence of about 1,000 hectares. His duty is to direct the planting and felling of trees. They (the underforesters) must have served twelve years in the army, and are required to be good marksmen.

When the areas are extensive or long-stretched keepers are also employed. The master foresters have the responsibility and management of their respective districts, and are held responsible for the revenues, according to the regulations annually issued. The timber is sold by public auction and the firewood is cut every year in conformity to the stipulated plan of administration and cultivation. At these sales an official forest cashier is present and, according to the lists of sales attested by the master forester, receives the amounts of the bids and renders an account of the same to the department. The buyer receives a receipt signed by the forest cashier for his lot purchased, which, however, he cannot remove from the forest before having delivered the receipt to the underforester, who assigns to him his lot. The master foresters have to serve practically one year or more in the forests. They must frequent one of the government forest academies and pass a good examination, as demanded by the regulations. Government schools have also been organized for the instruction of the minor officials.

FOREST REVENUES.

According to the "Etat" of the Prussian forest administration for the year ending April 1, 1886, which I had an opportunity of perusing, the total revenue was as follows:

Receipts.....	M. 52,985,000
Expenditures	<u>30,660,000</u>
Net proceeds	22,325,000

In my district the revenue is as follows:

Pomerania.....	M. 4,479,900
West Prussia.....	3,501,200
East Prussia.....	5,927,100
Total.....	13,908,200

Expenditures:

Pomerania.....	M. 1,798,169
East Prussia.....	3,207,196
West Prussia.....	1,880,210
Total.....	6,885,575

Net proceeds of the provinces, 7,022,625 marks.

Of the above expenses about one-fourth is absorbed by the salaries and gratuities of the first officials, the remainder in maintaining and managing the forests, and principally by constructing new roads.

Volumes might be written about the profits and advantages of the forest culture in general. I confine myself to mentioning only a few of the leading points, viz.: The only and certain protection against the advance of the sand from the seashore; inundation and the dangers of storms; the cultivation of areas of inferior quality that cannot be made use of for agricultural purposes, but are made to pay the proprietor by the growing and cultivation of trees, is to keep up and maintain the forests. Respecting the climate, the woods have a great influence on temperature, attraction of dew and rain, purification and cooling of the atmosphere, &c.

In mountainous regions the woods are the only effective protection against inundations, devastations by heavy rains and dew-waters in spring and early summer.

FOREST PLANTING.

I have been informed that there are numerous methods of forest planting and culture, and it would be quite impossible to explain such in a report, which differ according to the situation, the quality of the soil, the species, the time of the year for planting, and the climate, and in America would depend upon conditions most probably quite different from those in this country. In a fertile soil containing much richness the forest renews itself by the seeds dropping down from the full-grown trees, and by the planting of young trees in the bare places. On poorer, barren sandy soil the fir forests, which predominate in my district, are cultivated by sowing the fir seeds in rows distant one-half meter apart. After three years have elapsed the spots having remained bare are filled up by the young trees of three years' growth, which are planted closely or thickly, because by this means the growth of strong and straight trees is assured, which is of great importance. Premiums for renewing private forests are generally not paid by the government, except in some parts of the country where it has been deemed expedient to encourage the proprietors of large tracts of land of poor quality to cultivate them by growing trees, that climatic and other dangers may be avoided.

From time to time devastations occur by caterpillars, wind or snow; however, the damage is, in comparison to the whole area of the government forests, hardly of any importance. But many private forests have been cut down by the owners in order to secure larger sums of money by the sale of the timber and firewood. In many cases the area thus cleared has been cultivated for agricultural purposes, but now frequently, particularly when the soil is sandy and barren, it remains uncultivated and becomes valueless.

In this district, as before mentioned, the land being almost entirely level, the consequences of the destruction of forests are not so fatal as in a mountainous region where such destruction often causes the most dreadful inundations and the devastation of large fertile tracts of land, which has several times been the case in the south of France.

Respecting forest planting on and ameliorating the sand dunes and waste places, I have already reported that the greatest care is taken by the government and its forest officials to maintain the forests in a compact manner, particularly along the coasts, to prevent the wind, waves and sand from entering and spreading in the interior.

Some forests near the coasts being in possession of towns and villages, or individuals, laws have been enacted by the legislative bodies to protect them as much as possible; however, the result is far smaller than in the government forests.

TRADE IN TIMBER.

The staves required for wine, spirit and beer casks are taken from the oak forests, in which, at least in the government forests, young trees are carefully planted as fast as the older ones are felled. The oak forests of Prussia not being able to supply the number of staves required large quantities are imported from Hungary. No import premiums are paid on timber; on the contrary, by the laws of July 15, 1879, and May 22, 1885, high import duties have been imposed on timber in order to make the German forests yield higher profits to the owners, and to enable the latter to compete with the timber imported from foreign countries. The duties are as follows:

	Per festmeter. *
Raw goods and oak staves.....	M 1.20
Hewn timber	2.40
Sawn goods	6.00

The principal lumber market of this district is Dantzig. The exports from that point in 1886 were 273,000 festmeters, or 191,100 loads (one load is 50 cubic feet), as follows:

	Per cent.		Per cent.
Africa.....	.04	Denmark.....	.10
Germany	.12	Holland.....	.05
Belgium	.10	France.....	.16
England.....	.42	Spain.....	.01

* One festmeter = 35½ cubic feet.

Königsberg exported in 1886 116,348 festmeters, valued at 2,654,916 marks, and imported during the same period 211,651 festmeters, valued at 3,372,107 marks.

The supplies come mostly from Russia and Poland. The latter country formerly furnished the greater portion, but the forests in that country are becoming so reduced that farther regions are sought for. Since the duty came into operation the forests in East and West Prussia have been brought into requisition, and the saw-mills in the interior recruit their wants from these sources.

According to what I have been able to learn in this district no business of any importance is carried on in seeds and shoots by individuals. The administration of the government forests sells the surplus seeds at cost price, and large numbers of young trees from their nurseries at the lowest prices possible in order to assist and encourage thereby forest culture. Private corporations therefore cannot compete.

In the central part of Germany seeds are said to be sold by individuals and corporations in considerable quantities.

In conformity with the tenor of the circular, I send to the Department of State the two volumes of a work entitled "The Condition of the Forests, &c., in Prussia." This work contains in technical and practical respects, by its statistical tables, founded on official authority, a rich and valuable material for forming an opinion of the excellent administration of the government forests in Prussia.

In addition, I beg to add a work on sowing and planting by Burkhard, explaining and enlarging upon the many different methods of growing and planting trees in use in this country which might be made use of in our native country; also a copy of the lectures of the forest academy of Eberswalde and the "Forest and Hunting Calendar" for 1887.

ANDREW F. FAY,

Consul.

UNITED STATES CONSULATE,

STETTIN, *February 25, 1887.*

WÜRTTEMBERG.

REPORT OF CONSUL KIMBALL.

According to latest statistics, the forests of Württemberg cover about 1,499,940 acres of ground, or $30\frac{3}{10}$ per cent. of the total area; 483,977 acres or $32\frac{3}{10}$ per cent. belong to the crown and government; 472,425 acres or $31\frac{1}{2}$ per cent. to communities; 29,300 acres or 2 per cent. to societies, and 514,238 acres or $34\frac{3}{10}$ per cent. to private owners; 58 per cent. of the government forests consist of pine wood; 31 per cent. of leaf-bearing wood and 9 per cent. of leaf-bearing wood mixed with pine wood. The principal trees of the Württemberg forests are the pine, the fir and the beech.

In 1884 469,856 acres of government forests yielded 29,214,116 cubic feet of full grown wood, the product of which amounted to \$2,171,311 or 7 $\frac{4}{10}$ cents per cubic foot. The principal items of expenditure were the following:

Cost of administration.....	\$288,132 09
Cost of cultivation.....	74,038 23
Roads.....	119,536 45
Wages to wood-cutters.....	379,872 27

The total revenue was \$2,261,625; the total expenditure was \$1,025,148.35; profit in 1884 \$1,236,476.65, or \$2.63 per acre government forest.

In the previous five years the profit amounted to the following sums:

1879.....	\$999,610 47
1880.....	1,214,338 12
1881.....	985,845 03
1882.....	1,035,755 30
1883.....	1,200,269 70

In 1884 the wages of wood-cutters were, per cubic meter(=35 $\frac{1}{2}$ cubic feet):

Coniferous wood (peeled).....	\$0 20
Coniferous wood (not peeled).....	17
Leaf-bearing wood.....	24
Logs.....	26
Stem wood.....	40

The organization of the government forest bureaus in Würtemberg is as follows:

The government territory is divided into 21 forest districts and 147 sub-districts, with 21 chief offices and 147 subordinate offices. The functions of the 21 chief foresters are to superintend and to co-operate in the administration of the forests, which forms the duty of the 147 foresters. The average salary of chief forester is \$850 per year; of foresters, \$660. Both of the said officers are provided with lodgings at the expense of the government. The protection of the forests is entrusted to about 500 forest guards, drawing an average pay of \$220 per year; they are provided with arms and uniforms at the expense of the government. The government forest board, consisting of a president, six counsellors and various assistants and clerks, is attached to the treasury department, while the common forest board is attached to the ministry of the interior. The common forest board consists of five counsellors, three of whom are at the same time counsellors to the government forest board. The president of the government forest board is also president of the common forest board. His salary is \$1600; the salary of the counsellors, \$1400.

Forestry is taught at the University of Tübingen, Würtemberg and at other German universities. Applicants for the office of forester must have attended a course of study at a university. On having passed a first examination, they have to serve one year for trial as assistants to a forester and chief forester, after which time, on having passed a second examination, they are admitted as candidates for regular service.

The principal forest laws of Würtemberg, which I herewith enclose, consist of—

1. The penal forest law of Sept. 2, 1879.
2. The forest police law of Sept. 8, 1879.
3. The law on common forests of August 16, 1875.

The law on common forests is of special importance, as the common forests embrace nearly one-third of the total area covered with forests and represent a value of about forty million dollars. By said law the state asserts the right of providing in the interest of the communities that the cultivation and administration of common forests be based on scientific principles and entrusted either to experts, appointed by the community, or to government foresters.

The following figures show the kinds of culture in the government forests :

Culture of large trees growing for a period from 80–120 years.....97 $\frac{4}{10}$ per cent.
 Culture of middle-growth and under-growth growing for a period from 5–30 years 2 $\frac{6}{10}$ per cent.

The planting of shoots is now the generally adopted method of culture, while the method of sowing is getting more and more out of use. A great number of nurseries are attached to the government forest, the proportion being 1 $\frac{1}{2}$ acres of nursery to 1,000 acres of forest. The area sown in government forests in 1884 was 1,075 acres, (including 532 acres of nurseries), requiring 217 cwt. of seeds, while the area planted with shoots was 3,820 acres, requiring seventeen million shoots. The total expense for cultivating the said 4,895 acres of ground amounted to \$65,417, or \$13.36 per acre.

The forest laws of Würtemberg prohibit the destruction of forests (including common and private forests) without the consent of the government. Every application for destruction of forests is carefully considered in all directions and only consented to if the destruction does not injure any public interests. I applied to the board of government forests in order to know the proportion of destruction of forests to reclamation of ground by tree-planting, and I was informed that at present the latter approximately equals the former. The board added that proprietors will resort to tree-planting in cases where agriculture yields less profit than forest culture.

By far the greatest part of the lumber supply consists of home produce. The lumber cut in the Würtemberg forests is generally sold by auction. In 1884 the average prices at sales by auction were, per cubic meter or 35 $\frac{1}{3}$ cubic feet :

Lumber from oaks.....	\$6 17
Lumber from evergreens.....	3 04
Logs from beeches.....	1 47
Logs from evergreens.....	1 02

In 1884 the exports of lumber from Würtemberg amounted to 157,031 English tons; the imports to 128,237 English tons; surplus of exports, 28,794 English tons.

In 1885 exports amounted to 144,716 tons; imports, 127,930 tons; surplus of exports, 16,786 tons.

The customs duties on imported lumber are, per cwt.:

Beams and planks in primitive condition.....	\$o 2½
Lumber partly prepared for market.....	5
Lumber ware of general use.....	12
Coopers', joiners', turners', wagon-makers' ware.....	36
Parts of inlaid floors.....	1 43
Wooden furniture.....	2 40
Woodenware of refined make.....	7 15

Shoots can be easily obtained by application to the government forest board. As to seeds, I was informed by the president of said board that he can recommend from experience the firm of Christian Giegle, at Nagold, (black forest district), Württemberg.

C. P. KIMBALL,
Consul.

UNITED STATES CONSULATE,
STUTTART, *February 9, 1887.*

ITALY.

REPORT OF CONSUL-GENERAL ALDEN.

FOREST AREAS.

THERE are in Italy 10,270,467 acres of forests, of which 425,835 acres belong to the state and 9,844,632 acres belong to communes, other corporations and private individuals. Of the state forests 145,393 acres are by law declared to be inalienable, and the remaining 280,442 are alienable.

Of the entire forest area a little more than half is under forest bounds, and the remainder is free from forest bounds.

I have found it impossible to obtain the precise figures showing the distribution of the forest area in Italy owing to the fact that the official statistics do not precisely agree. The following table, however, is very nearly accurate:

	Acres.
Piedmont.....	1,100,000
Lombardy	1,000,000
Venetia	1,200,000
Liguria	500,000
Emelia.....	550,000
Marches and Umbria.....	1,000,000
Tuscany.....	70,000
Salerno	500,000
Southern Adriatic provinces	1,200,000
Southern Mediterranean provinces.....	2,000,000
Sicily	350,000
Sardinia.....	800,000
Total	10,270,000

The trees composing the inalienable state forests are classified as follows :

	Per cent.
Resinous trees.....	31
Oak	29
Beech	25
Chestnut.....	1
All others.....	14

No information as to the character of the trees in other Italian forests is attainable, but it is presumed that they do not greatly differ from those of the inalienable forests.

COMMON FORESTS.

The forests belonging to the communes are what might be called common forests, inasmuch as the population of the communes has in most cases the right of pasturing animals and gathering wood in such forests, subject to certain restrictions. Where pasturage is permitted the trees must have reached a size which renders them safe against injury by the browsing and trampling of cattle. The regulations for the protection of forests are enforced by the forest guards.

ADMINISTRATION OF FORESTS.

The general supervision of forests belongs to a special bureau in the ministry of agriculture, industry and commerce, called the *regime forestale*. The bureau is one of three which are under the direction of the director-general of agriculture. The immediate supervision of forests belongs to the provincial forest committees. A provincial forest committee consists of the prefect of the province, who acts as president ; of the forest inspector of the province, or in his absence of a forestal sub-inspector ; of an engineer, nominated by the minister of agriculture, industry and commerce, and of three additional members, nominated by the provincial council. These three members and the engineer hold office for two years, but may be renominated. The council of each commune will appoint a member, who will take part with the former in voting in such deliberations of the provincial forest committee as have reference to the commune which he represents.

The provincial forest committees adopt regulations for the preservation of forests, and decide upon requests for the reduction of forest areas into cultivated lands. Their decisions and regulations are carried into effect by forest inspectors and sub-inspectors (appointed by the ministry of agriculture, industry and commerce), and the inspectors are assisted by the forest guards, watchmen and custodians, who constitute the forestal police.

FOREST REVENUES.

No late statistics as to the revenues of the state forests and their cost of maintenance are attainable, but I am informed by the *regime forestale* and the ministry of finance that the annual revenues from forests are about as follows:

Alienable forests	£46,320
Inalienable forests.....	156,213
Total.....	202,533

The revenues are cleared mainly from the sale of wood for building, fuel and charcoal making, and from rents of pastures and buildings.

The approximate expense of maintenance of the alienable and inalienable forests, including laying out of new roads, building and repair of bridges, &c., is about \$510,285, of which the government pays about \$165,600 and the provinces and communes about \$344,685.

The cost of maintaining the forests is therefore in excess of the revenues. It must not be forgotten, however, that the constant sales of alienable forests render it impossible to give any trustworthy figures in regard to the annual revenues and costs of forests; and the only definite statement that can be made in the premises is that the forests cost more than they yield.

FOREST PLANTING AND FORESTRY SCHOOLS.

For the most part the forests are left to perpetuate themselves by natural growth. The *regime forestale*, however, cultivates shoots and seeds, which are gratuitously distributed. The average annual number of these shoots is about one million, and the average annual quantity of seeds distributed is about 4,408 pounds. The state also contributes about \$23,000 for replanting forests, but pays no direct bounties. There is a government forest school, the "Institute Forestale," at Vallambrosa, Tuscany.

This institute is under the direction of the ministry of agriculture, industry and commerce, which appoints the director and professors.

The pupils are either "ordinary" or "extraordinary" pupils. The former are expected to enter and remain in the service of the government in connection with forestry. The latter attend the institute merely in order to pursue, for their own benefit, studies relating to forestry.

The candidate for admission as an ordinary pupil must present a certificate that he is not less than 16 nor more than 22 years of age; that he is in good health, and of good character. He must also furnish a bond guaranteeing the payment of \$135.10 annually, for three years, or deposit with the prefecture of the province \$135.10, interest on which deposit will be paid to him in case he is admitted.

The extraordinary pupils are admitted on the same conditions, with the exception that they may be of any age above 16.

The course of instruction lasts for three years in the case of pupils who have not studied surveying and agriculture in a technical school. For those who have so studied, the course lasts two years.

Candidates for admission to the three years' course must pass an examination, partly oral and partly in writing, viz.:

1. The Italian language, including grammar and syntax.
2. The French language, including rules of pronunciation, grammar, syntax and translation from French into Italian.
3. Elements of geography.
4. Elements of natural history, including botany, zoölogy and mineralogy.
5. Arithmetic, including cube root and theory of proportion.
6. Algebra, including equations of two unknown quantities.

7. Elements of physics, including properties of matter, light, heat, electricity and meteorology.

8. Elements of chemistry, including nomenclature, simple and compound bodies, analysis and synthesis.

Candidates for admission to the two years' course are examined in—

1. Italian language and literature.
2. French.
3. German.
4. Natural history.
5. Algebra, plain trigonometry and analytical geometry.
6. Physics and chemistry.
7. Elements of agriculture.

Three unmarried forest guards, who have received honorable mention, can be annually admitted to examination for admission to the forest institute.

The course of study includes—

1. Language of literature of Italy, France and Germany.
2. Physics, chemistry, geognosy and agriculture, and their application to forestry.
3. Botany and zoology.
4. Forest economics, including mechanics, hydrostatics, strength of materials, culture and regulation of forests.
5. Topography and surveying, including drawing and all matters relating to mensuration and valuation of forests.
6. Legislation, including in addition to forest laws, the principles of law generally.

Pupils are furnished with a uniform at the cost of \$38.60. They must pass an examination at the end of the first and second year and a general examination at the end of the third year. Those who pass successfully are appointed sub-inspectors when vacancies occur, and until such vacancies occur, serve in the forest guard with the rank of brigadier.

DESTRUCTION OF FORESTS.

The destruction of forests in Italy has been due to the demand for lumber and firewood and for pasturage and arable land. Forest fires are rare and comparatively little destruction is caused by them. The usual results have followed forest destruction, such as the decrease in the depth of navigable streams, the conversion of perennial streams into torrents, dry in summer and overflowing in the rainy season, avalanches, landslides and freshets and the denudation of mountains.

SAND DUNES.

The government is at present occupied in the effort to prevent the drifting of sand dunes by planting them with trees. No extensive efforts to reclaim waste places by planting trees have yet been made, but the government proposes to plant forests on the slopes of denuded hills and mountains in order to prevent the sudden overflowing of torrents.

FOREST PRODUCTS AND TIMBER TRADE.

Italy produces annually about 243,990,550 cubic feet of lumber, by which term is meant logs and large pieces of lumber roughly squared. Planks and

firewood are measured by weight, and the annual production of planks and firewood is about 78,321,198 pounds.

The chief kinds of Italian lumber are fir, pine, larch, oak, poplar and chestnut.

I am informed from official sources that there are annually imported into Italy, from Austria, Switzerland, France, Spain and the United States and Canada, about 19,315,947 cubic feet of rough lumber, and about 6,207,932 pounds of planks, &c., chiefly of resinous woods.

In 1885 the imports of lumber from the United States and Canada (which are classed together in the custom house statistics) were as follows:

Lumber (rough or roughly squared) 896,254 cubic feet; planks and other sawed wood, 1,415,040 pounds.

No bounties on the importation of lumber are paid. The custom duties levied by the Italian government on lumber are as follows:

Lumber for cabinet-makers, sawed, per 100 kilograms (220 pounds).....	\$0.77½
Lumber, for cabinet-makers, unsawed, per 100 kilograms.....	0.38½
Lumber in boards or squares, for floors, per 100 kilograms.....	0.77½
Lumber, rough, hewed or square, including small boards for boxes, &c.....	Free.

The following dealers in shoots and seeds in the city of Rome have good business reputations: Cardella, No. 145, Via Babruni; Formilli, No. 146, Via Sistina; Zamperini, No. 12, Via Condotti.

There is but one general forest law of which I enclose a translation.

WILLIAM L. ALDEN,
Consul-General.

UNITED STATES CONSULATE-GENERAL,
ROME, *January 25, 1887.*

VICTOR EMANUEL II.

BY THE GRACE OF GOD AND THE WILL OF THE NATION, KING OF ITALY.

The Senate and the Chamber of Deputies have approved and We have sanctioned and do promulgate the following law:

TITLE I.

LANDS PLACED UNDER FOREST BOUNDS.

ARTICLE 1. There are placed under forest bounds, in accordance with the provisions of the present law, all woods and lands cleared of woods on the summits or slopes of mountains as far as the upper limit of the chestnut zone;* and also those that from their character and situation may, in consequence of being cleared or tilled, give rise to landslips, crumbings of the earth, cavings in, avalanches, or snowslips, and may, to the public injury, interfere with water courses or change the character of the soil, or in any way injure the local hygienic conditions.

ART. 2. Forest bounds, for reasons of public health only, can be placed only upon existing woods, and only in consequence of a resolution to that effect passed by the communal or provincial council concerned in the matter and by the provincial sanitary council.

* The "chestnut zone" is defined as the zone where the chestnut does or can grow, either naturally or with ordinary cultivation.

In the provinces, in which woods are not by the existing laws placed under forest bounds for reasons of public health, the commune or province that may demand the application of forest bounds to such lands must suitably indemnify the proprietors.

ART. 3. Lands properly levelled and kept levelled, or on which vines, olives, and other shade or fruit trees are cultivated, are exempt from the provisions of the present law.

ART. 4. On the lands designated in article 1, all wood-clearing or tilling is forbidden. Permission, nevertheless, will be granted to reduce them to cultivation in case the proprietors will provide proper means for avoiding injurious consequences, and such means as are recognized as efficacious by the forestal committee; the provincial sanitary committee being first consulted, should it be necessary.

Wood culture and wood-cutting are not placed under any prohibitory regulations. Proprietors, however, must conform to such regulations as may be established by each forestal committee.

Such regulations must be limited to the purpose of securing the firmness of the soil and the reproduction of the woods, and, where further hygiene requires it, their preservation.

ART. 5. In every province there is constituted a committee composed of the prefect of the province, who will exercise the functions of president; of an inspector, and, in the absence of a forestal sub-inspector, of an engineer, to be nominated by the minister of agriculture, industry, and commerce; and of three members nominated by the provincial council.

The council of every commune of the province will nominate another member, who will take part, with the form of voting, in the labors of the committee in such matters only as have reference to the commune which he represents.

The engineer nominated by the minister, and the elective members of this committee, will hold office for two years, and are eligible to re-election.

ART. 6. Within six months from the publication of the present law, the forestal inspectors will compile and present to the forestal committee a list by communes of the woods and lands placed under the provisions of existing forestal laws and those that ought to be released from forest bounds in accordance with the present law.

The committee having examined, wherever it may be necessary, the condition of such woods and lands, and having heard the provincial sanitary council so far as relates to the last clause of article 1, decides within six months upon the proposals and causes to be published contemporaneously in all the communes of the province the said lists.

The removal of forest bounds takes place fifteen days after the publication of the lists.

ART. 7. Upon the proposal of the forestal administration, of the communes and of the provinces, the committee will proceed to the examination of the lands that may be in the conditions referred to in article 1 of the present law in respect to water-courses and the consistency of the soil, and that may not have been placed under forest bounds.

After proper investigation the committee will decide upon proposals.

The necessary expenses for investigations required by this article will be charged to the state.

ART. 8. The forestal administration, as rapidly as the facts can be ascertained, will publish in every commune of the province, lists of the woods and lands placed under the forest bounds in such province. Any interested person may, within two years from the date of such publication, make application to the committee for the release of lands from forest bounds.

The committee, after having by due inquiry ascertained the condition of the woods or lands, decides upon the application.

The expenses of the inquiry will be charged to the proprietors interested.

ART. 9. When in consequence of works of conservation or reparation recognized as sufficient, or for any other reason, the causes for which any land has been placed under forest bounds, cease to exist, the committee, either of its own accord or at the request of the persons interested, will deliberate, after due inquiry into the facts, as to the release of the land from forest bound.

ART. 10. From the decision of the committee appeal may be made, by any one interested, to the council of states, which, having heard the representations of the forestal council and, in case of necessity, those of the councils of public works and health, and also those of the appellants, decides.

TITLE II.

REPLANTING OF TREES.

ART. 11. The ministry of agriculture, industry and commerce, and the provinces and communes, for the purpose of preserving the firmness of the soil and of regulating water-courses, may either, together or independently, take measures for replanting (with trees) lands under forest bounds.

The direction of works of replanting, made at the joint expense of the government, the provinces and the communes, is intrusted to the forestal committees.

A suitable provision in the budget of the ministry of agriculture, industry and commerce will provide for such part of the cost of replanting as is chargeable to the state.

ART. 12. Permission is given to the state, the province and the communes to proceed in the manner established by existing laws to the expropriation of the above-mentioned lands, for reasons of public utility.

The proprietor, nevertheless, will have the right to cultivate, in a manner consistent with the purposes of the present law, the land that may be expropriated, provided he makes a declaration of his purpose before he begins work, and provided he undertakes work within a period of six months and finishes it within the period that may be assigned by the forestal committee.

The forestal administration may, when money has been voted for the purpose, acquire waste lands in order to replant them, or to sell or otherwise dispose of them subject to the obligation to replant them.

ART. 13. The proprietors of land placed under forest bounds may unite together in order to provide for the replanting of the same, and for the preservation and defense of their rights.

The formation of such a union may also be ordered by the judicial authorities upon the demand of the majority of those interested, when there is a question of the preservation or defense of the common rights.

Proprietors dissenting from such union have, however, right to exempt themselves from obligations in the matter by surrendering their lands to the union at a fair price in which case their acquisition by the union is obligatory.

ART. 14. In case where replanting only is intended, the union may proceed in the way provided by the law to the expropriation of lands lying within the area to be replanted whenever the proprietors of such lands have not wished or do not wish to join the union, and there is proof that forestal culture cannot be carried out without the participation of the dissident proprietors, and that the latter would be benefitted by such culture.

The permission to expropriate may nevertheless be exercised only in case the expropriated proprietors are owners of at least four-fifths of the land forming the area to be replanted.

ART. 15. The provisions of articles 3, 4, 5, 6 and 7 of the law of May 29, 1873, No. 1387 (series 2), are applicable to the unions mentioned in article 14.

TITLE III.

PENAL REGULATIONS AND FORESTAL POLICE.

ART. 16. The proprietors who shall till or clear, or who having tilled or cleared, in contravention of the law, shall continue to cultivate land under forest bounds, or who shall not execute the works required in article 4, shall incur a fine of not more than 250 lire (\$42.25) for every hectare of land, and shall be compelled to make the land safe or wooded within the term of 18 months from the date of the sentence.

ART. 17. If within 18 months from the conviction referred to in the preceding article the land be not properly prepared for renovation or for replanting, or if the works mentioned in article 4 shall not have been executed, the prefect of the province shall order from the forestal agent an estimate of the work necessary to be done.

The offender within a month from the date of notification of the estimate must deposit with the secretary of the prefecture a sum corresponding to the estimated expenses, and the forestal committee will at once cause the work to be done. If the deposit has not been made, or if the cost of the work proves to be greater than the estimated sum, the sum due will be fixed by the order of the prefect in accordance with the rules governing the collection of direct taxes.

ART. 18. Private owners who, in woods placed under forest bounds, may violate the regulations of the forestal committee referred to in article 4, shall be punished with a fine of not less than double nor more than quadruple the value of the trees or shrubs cut down by them, or of other injury committed.

ART. 19. Administrators of corporations will be personally liable to the maximum penalty whenever they may be guilty of the offenses specified in the preceding articles, in addition to any penalties they may have incurred by committing offenses for their personal profit.

ART. 20. The offenses mentioned in articles 16 and 18, when committed by any one who is not an owner or administrator, will be punished not only with the penalties provided in said articles, but also with the corporal penalties provided by general penal laws, whenever the offenses are such as are provided for in said laws. The punishment for the offenses mentioned in article 16 shall not be less than three-fifths of the maximum; and the punishment for other offenses shall not be less than two-thirds of the injury inflicted, if the offenders are purchasers of woods, tenants of pastures, or other persons having the right to remain in the woods.

The punishment shall not be less than sextuple if injury shall have been inflicted on the nurseries and gardens of the forestal administration.

ART. 21. In forestal offenses the valuation of the trees or shrubs cut down, or of the injury inflicted, will be made by the forestal agents in accordance with the rules established in the general regulation for the execution of the present law. The parties interested will have the right to contest the valuation made by the forestal agents in the presence of the judicial authorities.

In addition to the penalties provided in the preceding articles, the sentence of condemnation will order the reparation of injuries in behalf of the person concerned.

ART. 22. When the offenses mentioned in the present law fall, for whatever reason, under the provisions of general penal law and would be by those severely punished, the penalty therein provided shall be inflicted, but it will never be inflicted for offenses of the lightest grade, except as provided in article 20.

ART. 23. The fines prescribed in the present law will be, in case they are not paid, commuted to arrest and imprisonment, according to their amount; the proportion and the limits, respectively, prescribed by the penal code being observed.

ART. 24. The forestal committee in each province will establish the forestal police regulations.

These regulations will be approved by the provincial council and put into execution by the ministry of agriculture, industry, and commerce, which, at the instance of the council of state, will annul such parts of such regulations as may be in conflict with the objects and provisions of the present law and of general laws and regulations.

FORESTAL ADMINISTRATION.

ART. 26. The cost of maintaining forestal officers and watchmen is charged to the state.

The cost of the custodians will be charged two-thirds to the communes concerned and the remainder to the province.

The provincial council, after hearing the forestal committee, will determine the number of guards, the amount of their pay, and the distribution of the expenses.

ART. 27. Forestal guards are placed on an equality with custom house guards by article 18 of the law of May 13, 1862.

ART. 28. Forestal agents are classed as officers of judicial police by the terms of the penal code of the law of public safety.

TITLE IV.

RIGHTS OF USE.

ART. 29. No rights of use, exceeding the terms of article 521 of the civil code, will be granted in regard to the woods and lands mentioned in article 1 of the present law.

ART. 30. All those claiming to have rights to pasture or other rights, in woods and lands under forest bounds in accordance with the provisions of the present law, must make, within two years of its publication, a declaration furnished with titles and other indications of the evidence in its support, at the office of the civil and correctional tribunal in whose jurisdiction is situated the land or woods in question. This declaration must be presented to the proper communal office, which will forward it to that of the tribunal.

On the expiration of the period above-mentioned the proprietors of the property have the right to forbid, in the manner prescribed by law, the exercise of the right of use to those who have not presented the above-mentioned declaration. The claimant to right of use has the right within six months after the date of such prohibition, to make the aforesaid declaration by paying a fine of from 5 to 20 lire, (\$0.96 $\frac{1}{2}$ to \$3.86).

On the expiration of the period last-above-mentioned those who have presented the proper declaration will be able to exercise the rights of use, and all other persons will be understood to have forfeited such right.

ART. 31. After having cited all interested parties, with due diligence, the civil and correctional tribunal proceeding summarily, will give judgment (with the right of appeal) as to the existence of the right claimed, and, if it exists, will define its nature and limits.

ART. 32. When rights of use are exercised or claimed by the whole or part of the population, then representation in the pleadings, agreements, and judgments, will be assumed by the proper municipal administration.

In such cases, the declaration prescribed by article 30 will be made by the municipal administration. In every case there is reserved to each person claiming rights of use the permission to prosecute them directly.

In case of neglect to make a declaration, the administrators of the commune will be personally responsible for any injury sustained by their constituents.

ART. 33. The state (except where the provisions of the law of November 1, 1875, No. 2734 second series, forbids), the communes and corporations, and also private individuals, can procure the release of their woods and lands from forest bounds, and whatever rights of use mentioned in article 29, and following articles.

ART. 34. Where the parties interested have not otherwise provided, the release will be made by the cession to the uses of a part of the wood and land subject to the right of use, having a value equal to that estimated to be the value of the right of use in such premises; or else by a compensation in money.

In case the exercise of pasturage, or of other rights of use, should be recognized to be wholly or in part necessary to the population, the ministry of agriculture, industry and commerce, after hearing the communal council, the forestal committee, and the state council, will have the power to suspend, for such period of time as may be clearly necessary, the right of release, regulating, nevertheless, the exercise of rights of use.

ART. 35. Demands for release will be made to the prefect, who, after hearing the forestal committee, will endeavor to conciliate the interested parties; and, when he does not succeed in so doing, will send them to the ordinary tribunal, before which proceedings will always be taken summarily.

TEMPORARY PROVISIONS.

ART. 36. In those provinces where there are no forestal laws, the provisions of article 7, of the present law, will be applied as soon as the government shall have collected the opinions of the communal and provincial representatives.

ART. 37. The prohibition of tilling is not applicable to lands included in the zone above the chestnut zone, if they are already reduced to cultivation, with the exception of the provisions of article 7.

ART. 38. For the commission mentioned in article 2 of the law of July 4, 1874, No. 2011, (second series) is substituted the forestal committee, established by the present law.

ART. 39. By regulations, to be published, after hearing the opinion of the council of state, will be established the limits and methods of proceeding in regard to complaints, and provision will be made for whatever else may be necessary in the execution of the present law.

We order that the present, furnished with the seal of the state, shall be placed in the official collection of laws and decrees of the kingdom of Italy, ordering all whom it may concern to observe it and to make it observed as a law of the state.

Given at Pollingo, the 20th June, 1877.

VICTOR EMANUEL.

GENOA.

REPORT OF VICE-CONSUL SCERNI.

The area of the forests in the Province of Genoa is 641,635 acres, of which 332,500 are under the forestal rules, and 309,135 acres are free from any rules.

Of the above 332,500 acres, 4,083 acres belong to the government, 40,000 acres to the community, and 288,417 acres to private individuals.

Among the forests of this province the one named "Cadibona" belongs to the government. It is situated in the community of Savona, and its area is 833 acres. In this forest the people of that district have a right to gather the dried leaves, dead wood, chestnuts, acorns, &c., that may be found on the ground.

The forestal administration has under its charge only the forest belonging to the government, and it enforces an observance of all the rules prescribed by the forestal law.

It does not interfere with forests belonging to private individuals unless asked to do so.

The forestal service is divided into two branches, technical and custodial. The whole service is assigned to an inspector. The province is divided into three districts, at the head of which there is an under-inspector, who, under the direction of the inspector, prepares the contracts for the sale of the timber belonging to the government or to the districts. He also sustains the definition of the forestal crimes before the judge.

The care of the forest is maintained by nine *brigadieri*, ten *vice-brigadieri* and twenty-six guards residing in the nine brigades and ten sections of brigades, among which the territory is divided.

The income from forests belonging to the government and to the districts from the sale of timber is on an average from 20 to 25 francs per two and one-half acres. The expense of administration amounts to about 0.3458 francs per two and one-half acres. The benefits derived from the forests are that they keep the earth together on the steep declines of the Appenine mountains, fertilizing the same with the falling leaves and spoils of vegetation, promoting thus a great absorption of the falling rains, and preventing an instantaneous evaporation.

In this province, since 1872, there have been 5,000 acres of land planted over with bushes, and this is still being continued.

The method used up to the present is as follows: Holes about two square decimeters in size are made in the earth, in which two or three seeds are planted. The seeds used must be according to the quality of the soil. There is a forestal training institute at Vallambrosa, Italy, where botany, physics, and mathematical measuring of the ground are taught; also the Italian, French and German languages. The training is for three years. From this institute under inspectors are chosen. To young men that have little property of their own, and who have passed with great success the examination for admission into this institute, the government allows half pension. There have been districts which paid all the expenses to have young men trained in this college.

For a good many years back there have not been any forests destroyed in this province. The damages suffered by the forests in former years, it is believed, were caused by the cutting of the same and by excessive pasturage where the forests were not sufficiently developed. Now these damages are repaired by replanting said parts.

The land not cultivated, but planted with bushes, is about 5,000 acres, and at the present day this work is still going on.

The forests of this province furnish a portion of the timber used in the construction of buildings, also bark for tanning purposes. A portion is exported prepared for cart and wagon wheels, staves, hoops, poles, &c.

There is no bounty on timber imported, but there is an import duty levied on the same, viz.: Fifty centimes per 100 kilograms on fire-wood and 70 centimes per 100 kilograms on all other qualities.

The names of the three reliable sellers of seed are as follows: Comizio Agrario, Genoa; Professor Antonio Casabona, Genoa; Castagorola & Figlio, Genoa.

The forests of this district are all under the general laws for Italy, there being no special forestal laws for this province.

FREDERICO SCERNI,

Vice-Consul.

UNITED STATES CONSULATE,

GENOA, *March 4, 1887.*

MESSINA.

REPORT OF CONSUL JONES.

Under Bourbon rule in Sicily, a law was passed August 21, 1826, prescribing regulations for forest culture and preservation, treating of the felling of timber, decortication, pasturage, &c. Laws of a similar character were in force throughout the different kingdoms and duchies of Italy at that time.

The political unification of Italy began in 1860; it was only, however, in 1877 that legislative unification was completed. On June 20, 1877, the Italian parliament passed a general forestry law. This law, together with the general regulations adopted in pursuance thereof (regulations of February 10, 1878), are now in force throughout the kingdom. This law prescribes how provincial bureaus shall be established, and also their duties. These provincial forestry commissioners enact such rules and regulations as are best adapted to their respective localities.

In obedience to the Department's circular I have endeavored to translate the regulations of the forestry commission for the province of Messina. These regulations are of course subject to annual revision and amendment. For a proper understanding of provincial forestry regulations reference must be had to the general forestry law of June 20, 1877, and the regulations of February 10, 1878.

Sicily was formerly celebrated for its admirable ship-building timber, but these magnificent forests have long since disappeared. Three-fourths of the province of Messina is mountainous, and these mountains now present a bald and naked appearance, except in the district of Mistretta, in the north-west corner of the province. Here we meet with the oaks, chestnuts, elms and ashes. The evergreen oak is found near the coast and in lower situations; it is generally isolated. Only a small portion of this province is in forest, government property principally; I cannot give accurate figures. The province employs fifty-five forestry guards at an annual expense of \$5,200.

There is no forestry school here. To procure seeds or shoots one must make a contract in advance with some peasant or small landed proprietor, as there are no reliable seedsmen or nurserymen in Messina.

Lumber is not exported from this district. In 1885 lumber (principally pine) weighing 2,153,262 kilograms, valued at \$124,706, and cabinet wood weighing 38,876 kilograms, valued at \$172,988, were imported into Messina. The lumber comes chiefly from Trieste. The customs duties are 1 lira (equal to 19 cents) per cubic metre on lumber that comes from countries with which Italy has no treaty.

WALLACE S. JONES,
Consul.

UNITED STATES CONSULATE,
MESSINA, *January 26, 1887.*

The following regulations relating to forestry culture and the felling of timber, established by the forestry commission of the province of Messina, in conformity with article four of the forestry law of June 20, 1877, and article 27 of the regulations for the carrying out of said forestry law, approved by royal decree February 10, 1878.

These regulations went into effect in the province of Messina on June 16, 1880:

TITLE I.

FORESTRY CULTURE.

ARTICLE 1. Whenever, for the purpose of replanting a forest, improving the conditions of its trees, or of changing the variety or location of the trees, it is necessary to fell old trees, remove the stumps, and prepare the land for replanting, the proprietor shall notify the forestry commission, setting forth the method he intends adopting and fixing the date for the completion of the work; two years are allowed for such work.

ART. 2. When a hillside has an incline of more or less than 20 per cent. and is likely to wash, the preparing of the land and the removal of the trees and stumps is carried out on alternate parallel sections. The sections to be cleared and replanted shall not exceed two meters in width; the alternate sections to be left intact shall not be more than six meters wide. When the replanted sections show a good stand of young trees, adjoining sections two meters wide may be prepared and planted out, and so on until the whole forest shall be renewed.

ART. 3. The felling of timber and the tilling of land on mountain sides shall be prohibited, except in spots, for a distance of fifty meters from the summit.

ART. 4. The above regulations for replanting shall apply to all lands held in servitude.

TITLE II.

FELLING OF LARGE TREES.

ART. 5. In thinning out forests of large trees care shall be taken to leave the heads of the trees best fitted for propagation within two meters of each other. These trees shall not be felled until younger trees shall have attained their maturity—their roots going deep enough to prevent the land from washing.

Large tracts of woodland shall be cleared in alternate parallel lines or squares, reserving the finest trees for propagation, sixty to the hectare (2.47 acres), at equal distances, if possible, for natural propagation and protection for the young trees.

A wooded section fifty meters square shall be left on all mountain tops, in which section thinning out of the trees shall alone be permitted.

ART. 6. In regard to forests held in servitude, in order to protect roads and houses from landslides and falling rocks, trees decaying or dying from age can be felled, if there shall be a new growth sufficiently vigorous to take their places, and these trees shall be cut down one meter from the ground. It shall be prohibited to reduce these forests to the condition of coppices or to pollard the trees.

TITLE III.

CUTTING OF THE GROWTH IN COPPICES.

ART. 7. In coppices the growth shall be cut down even with the ground and the stumps shall be trimmed smooth and with the slant of the land.

ART. 8. In cutting the growth in these coppices, of whatever variety, at least thirty of the best seedlings shall be left to the hectare, as a nucleus, and they shall, if possible, be equidistant from each other and old enough to propagate, thus facilitating the natural growth of wood on the land.

These nuclei shall not be felled before they shall have fulfilled their mission; should they, however, be cut away entirely or in part, they shall be replaced by other plants.

When trees grown from the seed shall be lacking, the most vigorous sprouts thrown up by roots and stumps shall stand in their stead until seedlings shall have been procured.

TITLE IV.

THE FELLING OF TIMBER AND CUTTING OF WOOD IN FORESTS, THE GROWTH OF WHICH CONSISTS OF BOTH LARGE AND SMALL TREES.

ART. 9. In the felling of timber in forests of the above character, one hundred trees of large growth and full development shall be left standing to the hectare in order to prevent landslides and the spread of malaria, and in case these forests shall be held in servitude, these trees shall not be felled before they shall have reached maturity, when they shall be replaced by other trees equally vigorous; these trees in their turn shall not be cut for the reasons above named.

When, however, it shall be impossible to hold in reserve the above quota, double the number of good sprouts and suckers shall be substituted in their stead which sprouts and suckers shall be allowed to grow until the forest shall have required its normal condition; that is, until it shall have been renewed by the planting of seedling trees which shall have attained their maturity.

TITLE V.

RENEWAL OF FORESTS.

ART. 10. When for want of suitable trees it shall be impossible to retain for a nucleus the number of trees prescribed for each hectare, or when there shall be clearings or vacant spaces in the forest, covering $9\frac{1}{2}$ square meters and over, in which the renewal of wooded growth by natural propagation shall have become impracticable, the proprietor shall be required to seed down the land or to set out young trees within the period of two years from the last cutting.

Similar artificial culture shall be resorted to whenever, at the expiration of three years from the last cutting, a complete renewal of growth in the vacant spaces shall not have been obtained by means of the trees reserved as stock.

Level lands and lands not subject to slides shall be exempted from the above requirements, also pasture lands, provided they shall have been recognized by the commission as indispensable for pasturage.

TITLE VI.

TIME FOR FELLING TIMBER.

ART. 11. The felling of timber in forests of large trees, of broad and narrow-leaf species, as well as in forests of large and small trees mixed, shall occur during the period that elapses between the falling and the budding of the leaves.

When, however, the land is to be cleared, the cutting may be done at any season of the year, provided: the forestry commission shall have been notified in conformity with article 1; provided no undergrowth shall exist on the land at the time, and, provided, the proprietor shall agree to replant the area cleared.

TITLE VII.

THE REMOVAL OF BARK AND THE EXTRACTION OF RESIN.

ART. 12. The bark shall be removed from such trees only as are to be felled during the ensuing year; the felling of these trees may take place at any season.

ART. 13. In such cases as it shall be lawful to fell cork-trees, then, and then only, shall it be permitted to strip off their bark; but in these cases it shall not be necessary to await the natural shedding of the bark, but it may be removed at such time and in such manner as may be prescribed.

ART. 14. It shall be lawful to remove the bark from young cork-trees, for the first time, when they shall have attained the age of 15 years, which operation shall not be repeated oftener than once in seven years.

ART. 15. Whenever it shall be lawful, as prescribed in article 14, to remove the bark, the trees shall be barked between June and August.

ART. 16. It shall be lawful to decorticate the entire cork-tree, to remove its inner bark and the fine skin that adheres to the heart of the tree, when the tree is to be felled during the following cutting season, in which case cork-trees shall be put on the same footing as all other varieties of trees.

ART. 17. Resinous trees which shall have been decorticated and felled during the ensuing year shall be removed from the forest as soon as they are cut, in order to prevent insects, especially those of the "coleoptera" class from attacking the trees which remain in the forest.

ART. 18. It shall be lawful to extract resin from trees that have passed their first stages of growth and acquired a good size.

The extraction shall take place between April and the end of August, and in accordance with the French system, known as "Gemmage à vie," or other similar systems.

[N. B.—The French system, known as "Gemmage à vie," consists in removing, between April to May, and even as late as September, a rectangular block of bark (chip) 12 to 16 centimeters in width by from 35 to 50 in height, beginning at the base of the tree, having care to cut deeply into the sap-wood. The sap flows into a hole prepared in the ground at the foot of the tree, or into a hole hollowed out in a root of the tree.]

ART. 19. The extraction of resin shall be subjected to no restrictions when the trees are to be felled.

TITLE VIII.

GATHERING OF LEAVES, GRASS, AND SEED.

ART. 20. In forests dying out or thinly provided with underwood, the gathering of leaves and seed shall take place at intervals of three years. In new groves, and in old groves with a good stand of young trees, the grass shall not be cut until the young trees shall be four years old; a hand-sickle shall be used until the trees are well grown, as they might be injured by a scythe.

TITLE IX.

AREAS FOR COAL KILNS AND FOR THE PREPARATION OF POTASH.

ART. 21. Coal kilns shall be built on the old sites; when it becomes necessary to build new ones, they shall be made in open places where there is no danger of damaging the surrounding trees.

In default of vacant spaces, kilns shall be made in the least thickly wooded localities, the proprietor being obliged to set out new trees just as soon as the coal shall have been burnt, unless he shall wish to keep these sites for permanent kilns.

The same rules shall be observed with regard to areas required for the preparation of potash.

TITLE X.

ROADS FOR REMOVING ROUGH AND WORKED TIMBER AND CHARCOAL.

ART. 22. Timber (in the rough, sawed, or hewn) and charcoal shall be hauled from the forests over the roads and paths, and not through the young trees or over newly cleared ground.

Whenever it shall become necessary to open new roads, they shall be laid out so as to cause the least possible damage, and it shall be incumbent on the proprietor to replant the ground so utilized as soon as the timber shall have been removed, unless it shall have been decided to retain these roads permanently.

TITLE XI.

FOREST PASTURAGE.

ART. 23. Goats shall not be allowed in forests held in servitude; goats shall be allowed only on rocky, uncultivated ground, except when from the scarcity of pasturage, the condition of the forests, and the imperative demands of the neighborhood it shall become necessary to extend the above limitation.

The forestry official of the district, in connection with the local mayors, shall make out and establish annually a list of the localities in which goats shall be permitted to run, which list, having first received the approbation of the commission shall be published in each and every commune (district).

Horned cattle and hogs shall not be allowed to run in forests until the young trees shall have acquired a height and size sufficient to protect them from being trampled down or injured by barking.

TITLE XII.

PREVENTATIVE MEASURES AGAINST FIRE.

ART. 24. To protect forests from fire, it shall be required that all woody detritus caused by the felling of trees be removed, as well as all dead timber lying on the ground; the wood that can be utilized shall be piled in the open places, if possible near springs, tanks or cisterns, or by the sides of the roads that run through or near vacant places.

Should a fire break out, the dried leaves and grass shall be raked up to keep it from spreading; if a belt of trees is likely to catch on fire, it shall be felled and a ditch of suitable width shall be dug in order to stop the spreading of the flames.

The owner of a burnt grove shall trim up all the trees injured by the fire that are still capable of putting on new growth; if the trees shall have been killed and the burnt district not be in a condition to produce volunteers, the owner shall replant his grove within a period of two years from the date of the fire, making an entire or partial renewal, according to the area burnt. It shall be lawful for the commission to take into consideration the means of the proprietor and to grant an extension of the time for the completion of the work.

TITLE XIII.

PRESERVATIVE MEASURES AGAINST INSECTS.

ART. 25. All timber and wood lying on the ground, all old trunks of trees and decayed or decaying stumps shall be removed from the forests, to protect the trees from the attacks of insects.

When insects make their appearance in a locality, their propagation shall be prevented by the destruction of their eggs and nests, by whipping them off of the infected trees, by using sulphur and by keeping fires under the trees during the night. The eggs and nests shall be gathered up and burnt at a distance from the forests.

When these measures shall prove insufficient, the trees shall be felled without delay, and all infected wood shall be removed from the forest and converted into charcoal.

In every instance the proprietors shall notify the mayor of the locality and the forestry official of the district as soon as he shall have discovered the presence of parasites, that they may apply remedies best suited to stop the spread of the evil.

TITLE XIV.

RULES RELATING TO THE RIGHTS OF CITIZENS TO GATHER WOOD AND PASTURE STOCK IN THE COMMUNAL (DISTRICT) FORESTS.

ART. 26. In forests in which the inhabitants of the commune have the right to cut and gather green twigs and branches, this cutting shall be done in accordance with the rules established in the present regulations.

ART. 27. All persons who have the right to pasture stock in the communal forests shall exercise that right according to the dispositions of article 23 of the present regulations.

TITLE XV.

PENAL REGULATIONS.

ART. 28. The violation of the rules contained in articles 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 21, 22 and 24 shall be considered as unlawful felling and cutting of wood, and shall be punished according to articles 16 and 17 of the forestry law of June 20, 1877.

The violation of the other rules laid down in the present regulations shall be punished as prescribed in articles 18, 19, 20, 21, 22 and 23 of the forestry law and in articles 40, 41 and 42 of the general regulations adopted for the carrying into effect of said law, under date of February 10, 1878.

Article 29. The assessment of damages, of which article 44 of the general regulations treats, shall be fixed at 5 per cent. for large trees and for coppice growth as well.

LOMBARDY.

REPORT OF CONSUL CROUCH.

The present law governing the forests of Lombardy is that of June 20, 1877, in force throughout the kingdom of Italy, which abrogated the law of 1811 in Lombardy and other local laws in different parts of Italy. It subjects to its provisions, first, all wooded and unwooded lands on the tops and sides of mountains above the uppermost limit of the chestnut tree (in Lombardy from 2,000 to 3,000 feet above the level of the sea); and, second, all lands beneath this limit where the removal of trees and underbrush might cause the earth to become loosened and thus give rise to landslides and similar disturbances, or alter the course of streams, or change the condition and coherence of the soil, or in any way affect unfavorably the local hygienic conditions. Under class number one level or gently-sloping lands, particularly adapted to agriculture, or already cultivated, or covered with vines, olive trees, or fruit-bearing plants of a similar nature, are exempted from the provisions of the act.

Such wood lands as do not belong to either of the above-mentioned classes are not directly subject to governmental supervision. The proprietors, however, must have regard for certain regulations established by the board of forestry and approved by the minister of agriculture, the aim of which is to maintain the proper consistence of the soil, where this is of importance (as, for instance, on the banks of streams), and to effect the replanting of trees and their preservation where this may be required by the local hygienic conditions.

FOREST AREAS.

The extent of the forests in the different provinces of Lombardy, and the division into the classes mentioned above, are exhibited in the following tables. The unit employed is the acre, and the time, December 31, 1883, since which date there have been no material changes:

Provinces.	Belonging to the crown.	Belonging to communal banks and similar institutions.	Private.	Total.
Bergamo		84,082	127,619	211,701
Brescia	47	188,562	162,267	350,876
Como		92,526	156,710	249,236
Cremona		3,055	20,520	23,575
Mantua		215	5,674	6,454
Milan	1,396	8,780	62,872	73,048
Pavia	57	29,918	55,565	85,640
Sondrio		101,020	45,852	146,820

Provinces.	Forests subject to the law.			Forests not subject to the law.		
	Above the limit of the chestnut.	Below the limit of the chestnut.	Total.	Above the limit of the chestnut.	Below the limit of the chestnut.	Total.
Bergamo	154,743	4,584	159,327	1,428	59,366	60,794
Brescia	177,065	149,828	326,993	274	19,386	19,660
Como	90,545	79,672	170,217	1,772	14,669	16,441
Cremona					20,874	20,874
Mantua					7,653	7,653
Milan					32,616	32,616
Pavia					39,647	39,647
Sondrio	154,842	4,584	159,426	2,474	7,832	10,306

Provinces.	Lands above the chestnut tree limit excepted from the law.			Lands, exclusive of forests, above the chestnut tree limit subject to the law.			Lands, exclusive of forests, below the chestnut tree limit subject to the law.		
	Brush.	Bare.	Total.	Brush.	Bare.	Total.	Brush.	Bare.	Total.
Bergamo	304	45	349	94	25,542	25,636	20	69	89
Brescia				15,192	72,466	87,658	3,175	15,996	19,171
Como		220	220	6,749	29,187	35,936			
Cremona									
Mantua		109	109						
Milan									
Pavia	19,799		19,799	10,781	10,781	21,562	6,112		6,112
Sondrio	8,802	29,283	38,085	14,083	11,165	25,248	756	2,797	3,553

The forests of the communes are managed substantially like private forests. They are usually divided into lots, which are let for a period of several years with certain restrictions. Other communes sell only such wood as has arrived at maturity. The majority of them, however, reserve for themselves the right of pasturage, of collecting dead wood and fallen branches, leaves and other secondary products.

In well-managed communal forests, and all forests under governmental supervision, pasture is only allowed where trees are so tall that their terminal branches and buds are in no danger from the animals. Hogs are sometimes allowed in the forest, but must have iron rings fastened to their snouts. Goats, which are peculiarly destructive to young trees, are only allowed in brushwood, composed of rhododendrons and mountain elders.

GOVERNMENT FOREST BUREAUS.

The law provides for the formation of a board of forestry in every province where there are lands subject to its provisions. This board consists of the prefect of the province, who is *ex-officio* president of the board; of the inspector of forests; of an engineer, appointed by the government, and of three members, chosen by the provincial council. Further, each communal council appoints a member, who takes part in the deliberations of the board

as far as his commune is interested. Not every province has an inspector, as in some the interests are too small. In such cases two or more provinces are grouped together. Italy is thus divided into a certain number of departments, at the head of each of which is an inspector of forests. Each department is divided into a certain number of districts, and to each district is assigned a sub-inspector, accountable to the inspector of the department.

The forests are protected by a forest police. These latter, on an equality with the revenue guards, are appointed by the prefect of the province, with the advice of the board of forestry. Their number and pay are determined by the provincial council, with the advice of the board of forestry. The expense of maintaining them falls, two-thirds to the communes particularly interested, the remaining third to the province as a whole. The members of the board appointed by the provincial and communal councils receive no pay. The salary of the other officials is paid by the general government.

REVENUES FROM GOVERNMENT FORESTS.

To illustrate the revenues from the forests of Lombardy I give tables covering the five years ending 1883. I may preface them with the explanation that the forests are divided into three classes: First, those in which the trees are allowed to grow naturally, and the trunks thus attain a certain height and thickness. These I term "highwood forests" (*boschidi alto fusto*). Second, those in which the trees have been cut close to the ground, and from the stumps shoots allowed to grow. When these attain a certain size, permitting of use for firewood, stakes, &c., they are cut and a new lot allowed to grow. There is usually a certain admixture of saplings and underbrush. These forests I term "brushwood" (*cedno*). Third, mixed forests.

As the principal products lumber, firewood and charcoal are understood. The secondary products consist of bark, resin, chestnuts, acorns, mushrooms, truffles and the like.

Table exhibiting the products of highwood forests in Lombardy, subject to the forest law, for the five years 1879-1883.

		1879.	1880.	1881.	1882.	1883.	Total.
<i>Conifers:</i>							
Lumber.....	{ C. M..	34,036	37,420	36,941	28,748	39,580	176,728
	{ Frs....	616,420	662,820	574,992	449,550	639,422	2,943,204
Firewood	{ C. M..	16,259	17,806	17,680	18,988	25,948	96,681
	{ Frs....	78,183	87,794	87,033	89,741	112,487	455,238
Charcoal	{ C. M..	38,985	32,675	34,000	27,340	34,028	167,028
	{ Frs....	277,712	217,460	204,082	152,780	214,313	1,066,347
<i>Broad-leaved trees:</i>							
Lumber	{ C. M..	1,757	10,179	10,905	9,828	8,930	41,599
	{ Frs....	66,966	302,934	319,607	276,816	263,610	1,229,933
Firewood.....	{ C. M..	12,103	44,946	45,760	34,440	44,722	184,971
	{ Frs....	83,365	290,180	270,616	238,348	277,428	159,937
Charcoal.....	{ C. M..	13,236	9,978	7,740	7,475	41,257	79,686
	{ Frs....	102,771	76,074	51,412	53,433	363,066	646,780
<i>Mixed forests:</i>							
Lumber	{ C. M..	715	556	675	1,353	1,955	5,254
	{ Frs....	20,250	15,320	15,900	26,613	42,325	120,408
Firewood.....	{ C. M..	7,614	8,140	7,300	2,152	3,047	28,262
	{ Frs....	17,000	18,180	16,880	10,576	15,157	77,793
Charcoal.....	{ C. M..	1,650	1,500	1,615	2,250	2,632	9,656
	{ Frs....	17,400	13,695	8,000	10,149	9,131	58,444
Total	{ C. M..	126,355	163,218	162,619	135,574	208,099	769,865
	{ Frs....	1,278,064	1,684,447	1,549,621	1,308,013	1,937,939	7,758,084

Table of the products of the brushwood forests of Lombardy, subject to the forest law for the five years ending 1883.

		1879.	1880.	1881.	1882.	1883.	Total.
<i>Simple:</i>							
Stakes, poles, hoops, etc.....	{ C. M..	17,548	19,485	15,830	15,009	19,270	87,142
	{ Frs....	277,744	321,530	171,430	211,967	301,260	1,283,931
Firewood.....	{ C. M..	103,703	158,770	155,360	192,096	301,806	912,635
	{ Frs....	409,839	677,346	559,480	669,889	1,162,864	3,479,418
Charcoal	{ C. M..	51,990	91,374	63,340	63,033	92,347	362,084
	{ Frs....	377,926	685,218	423,808	409,899	752,334	2,649,185
<i>Mixed:</i>							
Stakes, poles, hoops, etc.....	{ C. M..	9,072	6,608	6,160	6,032	5,990	33,862
	{ Frs....	94,447	68,749	63,690	64,351	68,173	357,410
Firewood.....	{ C. M..	72,037	95,072	81,370	73,218	75,274	376,971
	{ Frs....	231,033	410,297	328,529	316,799	329,089	1,615,677
Charcoal	{ C. M..	86,218	72,780	71,740	62,320	71,393	364,451
	{ Frs....	716,104	598,227	553,937	473,779	501,068	2,913,115
<i>Pollards (Capitozzi).</i>							
Stakes, poles, hoops, etc	{ C. M..	715	530	500	166	160	2,701
	{ Frs....	5,362	3,975	3,700	1,295	1,280	15,612
Firewood.....	{ C. M..	6,900	8,698	8,958	5,680	5,650	35,526
	{ Frs....	22,725	32,490	32,584	27,286	29,325	144,410
Charcoal	{ C. M..	3,957	2,650	2,600	1,385	1,400	11,992
	{ Frs....	25,149	17,887	17,420	9,280	9,450	79,186
Total.....	{ C. M..	352,140	455,967	406,498	419,839	473,290	2,206,734
	{ Frs....	2,160,329	2,815,719	2,154,518	2,184,575	3,222,843	12,537,944

Table of the secondary products of the forests of Lombardy, highwood and brushwood, subject to the forest law for the five years 1879-1883.

		1879.	1880.	1881.	1882.	1883.	Total.
Oak bark for tanning.....	{ Quint.	24,012	28,116	33,254	30,610	40,050	156,042
	{ Frs ...	72,853	58,275	74,954	65,498	107,400	378,980
Bark of conifers for tanning.....	{ Quint.	4,650	2,129	2,760	3,912	6,780	20,231
	{ Frs ...	17,900	10,493	6,527	9,042	14,520	58,482
Acorns.....	{ Quint.	2,421	4,322	2,400	1,500	14,520	19,626
	{ Frs ...	12,120	21,410	12,000	7,500	8,980	58,454
Chestnuts.....	{ Quint.	73,240	78,051	65,763	87,064	103,805	407,823
	{ Frs ...	723,700	935,633	772,835	824,048	1,019,265	4,275,481
Mushrooms.....	{ Quint.	4,824	6,227	5,552	4,545	3,739	24,887
	{ Frs ...	156,344	204,042	126,285	105,335	97,127	689,131
Truffles.....	{ Quint.	33	103	34	34	47	251
	{ Frs ...	22,230	57,150	13,720	24,000	16,850	133,950
Heather.....	{ Quint.	4,150	7,458	6,564	4,150	8,270	30,592
	{ Frs ...	6,514	14,050	3,145	2,960	3,295	29,964
Genzian.....	{ Quint.	285	182	281	364	237	1,349
	{ Frs ...	4,412	2,040	3,990	4,602	3,700	18,744
Green leaves.....	{ Quint.	10,000	5,600	5,600	57,933	22,500	101,633
	{ Frs ...	20,000	8,400	2,520	103,966	30,750	165,636
Dry leaves.....	{ Quint.	209,200	412,061	459,920	375,300	555,918	2,012,399
	{ Frs ...	276,980	305,595	135,001	116,602	185,681	1,019,857
Resin.....	{ Quint.	.....	.....	.....	.....	6	6
	{ Frs ...	.....	.....	.....	.....	240	240
Dry leaves for litter, &c.....	{ Quint.	314,700	275,557	255,030	220,750	298,579	1,364,616
	{ Frs ...	531,620	167,568	81,551	221,017	290,730	1,292,486
Broom.....	{ Quint.	120	1,613	2,400	1,208	1,465	6,806
	{ Frs ...	814	3,098	1,890	1,388	4,690	11,880
Other products.....	{ Quint.	10	160	14	10	4,261	4,455
	{ Frs ...	50	850	56	35	18,219	19,210

[Quint.=Quintale=220.548 pounds.]

Grand total: Quintales, 4,150,716; francs, 8,152,499.

Table exhibiting losses by fire and falling trees in the forests of Lombardy subject to the law for five years, 1879-1883.

	1879.	1880.	1881.	1882.	1883.	Total.
<i>Fires:</i>						
In highwood.....			17	8	19	44
In brushwood.....	8	29	29	41	6	113
Extent in hectares.....	80.55	111.35	271.25	189.46	170.28	822.89
Damage in francs.....	1,793.00	11,740.00	25,839.44	11,203.00	7,442.00	58,017.44
Authors known.....	6	18	11	17	13	65
Authors unknown.....	2	11	35	32	12	92
Known causes—						
Intention.....		3	7	2	.....	12
Negligence.....	7	20	34	26	5	92
Accident.....	1	6	5	21	20	53
<i>Falling trees:</i>						
In highwood.....	9,725	752	2,592	4,050	2,814	19,933
In brushwood.....		425	.....	375	50	850
During wood-cutting—						
Avoidable.....						
Unavoidable.....		404	.....	268	100	772
Winds.....	9,725	773	2,592	4,157	2,764	20,011
Damage in francs.....	23,045.07	3,370.00	4,351.00	5,506.00	4,056.00	40,328.07

FOREST PLANTING AND CULTURE.

In timber lands the trees are numbered, and a certain number are selected to be cut when they are sufficiently mature for the purposes of commerce. Chestnut trees, however, are never cut except when the yield in chestnuts is no longer in proportion to their value as wood. The value of the timber is estimated by fixed tables, according to the height and diameter. In some cases, in order to improve the condition of the forests and change the species of trees, the timber is felled in blocks not larger than one and one-quarter acres, alternating with others where the trees are left standing. When the reforestation of the blocks cut is well started the remaining blocks are likewise felled. A certain number of trees, not less than thirty to the acre, are left standing, as sources for seed, to secure a new growth, and the trees selected for this purpose must be healthy and vigorous. If this does not suffice seed must be sown. If at the end of three years it is evident that the reforestation will not be accomplished thus, recourse is had to transplantation. In lands subject to the provisions of the law the proprietors are held responsible, and if they neglect this reforestation they are fined in accordance with certain fixed tables and a certain rate of interest, from which the damage occasioned by their neglect is computed.

In forests on steep declines, and further where their existence is necessary for the protection of the inhabitants of lands below, and of public highways, and the prevention of landslides, only so much cutting is done as will prevent crowding and allow the vigorous development of the trees. In such case the mature trees are selected.

The wood from the forests is either sold as timber or firewood, or is converted into charcoal, according to the accessibility of markets and other economical factors. In general it is cut at the age of from nine to twelve years.

Many other details will be found in the copy of the regulations of the board of forests in the district of Coma, which I transmit with this report, accompanied by a translation.

The best known school of forestry in Italy is that of Vallombrosa, near Florence.

DESTRUCTION OF FORESTS.

The destruction of forests has proceeded to a great extent in Italy, and much land fit for no other purpose has been denuded of trees. The cause in general is overpopulation and the consequent greater demand for agricultural land, and especially for grazing land. There is a constant tendency in that direction. The agricultural land displaces the grazing land, and the latter encroaches on the forests.

A laxity in the matter of grazing in the forests and brushwood has also had its share in the disappearance of the forests. Especially goats have prevented the lands from rewooding by devouring the young trees as they shoot from the ground until finally they have ceased to grow.

Various results are attributed to the disappearance of the wood land. An undoubted one is the appreciation in the price of firewood, as is shown in the following table of the price of firewood at Milan for the decades from 1800 to 1880 in francs (\$0.193), per quintal (220.548 lbs.):

Francs.	Francs
1800-1810..... 2.76	1860-1870..... 3.90
1810-1820..... 2.91	1870-1880..... 4.55
1820-1830..... 3.10	1881..... 4.46
1830-1840..... 3.69	1882..... 5.28
1840-1850..... 4.20	1883..... 5.25
1850-1860..... 3.87	

Landslides have become more frequent, highways imperilled, and water courses damaged. Many attribute to the same cause the unusually cold weather of late years; the late springs, winds, hail, the lack of water in the streams; with what justice it is difficult to determine.

RECLAMATION OF WASTE PLACES BY TREE PLANTING.

The method adopted for reclaiming waste places, especially tracks of sand on the sides of mountains, exposed by torrents, landslides and the like, is, in brief, as follows: The first thing is to prevent further slides, and to give the place some stability by means of stakes and branches and twigs intertwined in the manner of wickerwork. Then a small amount of earth, or humus, is brought in order to give the vegetation a start, and the hardiest forms of vegetation, heather, briars and the like are planted or protected in their growth. When these have once begun to grow the problem is regarded as well on the way to a solution. Gradually higher forms are introduced, such as the mountain elder, dwarf pine, locust and the like. Above all every form of pasture must be prohibited. The trees are not allowed to grow to any great height, but the place is kept covered with brushwood, and the trees are cut frequently near the ground so as to allow the roots to send up new shoots. The great object is to secure an interlacing of the roots throughout the whole extent, and thus assure the stability of the soil. In the course of time the soil enriches itself with the fallen leaves and other vegetable matter, and the desired object has thus gradually been attained.

SOURCES OF LUMBER SUPPLY.

The chief source of pine and larch lumber for Lombardy is Austria-Hungary and, to a smaller extent, Switzerland. The best quality comes from Tyrol. For the last six or eight years the consumption of Georgia pine, shipped from Pensacola, Fla., has been increasing steadily, and it would seem as if other lumber might be exported profitably from the United States to Italy. Oak lumber comes from the districts of Umbria, the Marches, Tuscany, and Southern Italy. It grows also in smaller quantities in Lombardy, Venetia, and Piedmont. The best quality comes from the mountain range of the Appenines. It is also imported from Austria-Hungary, but this latter is not so compact, nor of so long duration.

The price for transportation from Austria to Milan is from 25 to 27 francs per ton. The weight of pine and larch lumber averages as follows:

Pine, sawed.....	Kilograms to the cubic meter...	550
Pine, in round beams	do.....	650
Larch, sawed	do.....	800
Larch, in round beams.....	do.....	850

The present prices in Milan are:

	Francs.
Pine boards, 15 to 16 millimeters thick, 4 meters long—	
first quality.....	per cubic meter... 50-55
second quality.....	do..... 40-45
Pine beams, round, 20 to 30 centimeters in diameter, 6 to 12 meter long.....	do..... 30-32
The same, hewn square	do..... 33-38
Larch boards—first quality.....	do..... 70-80
Larch boards—second quality	do..... 60-66
Oak boards, according to quality.....	do..... 80-120

There is no duty on lumber entering Italy. The city of Milan levies a duty of 0.75 francs for timber in the rough, 1.20 for sawed and hewn lumber, and 2 francs for wood-work per quintal of 220.548 pounds.

In accordance with the provisions of the law, all girders, &c., in the construction of houses must be of iron, and in general much less wood is used or allowed in building in Italy than in America.

SELLERS OF SEEDS AND SHOOTS.

The following three firms are known as reliable horticulturists:

Fratelli Ingegnoli, Corso Loreto 45, Milan; Guiseppe Sada, Principe Umberto 18, Milan; Giovanni Beretta e Figlio, Corso Magenta 85, Milan.

LOCAL LAWS.

I transmit herewith a translation of the regulations for the forests of the Province of Como.

HENRY C. CROUCH,

Consul.

UNITED STATES CONSULATE,

MILAN, *April 23, 1887.*

REGULATIONS FOR THE CULTURE AND WOOD-CUTTING IN THE FORESTS SUBJECT TO THE PROVISIONS OF THE FOREST LAW OF JUNE 20, 1877, No. 3917.

TITLE I.

REGULATIONS FOR ALL FORESTS.

ARTICLE I. The clearing off of trees and breaking up of the soil in an existing forest, for the purpose of improving the condition by sowing and planting of trees of a similar or different nature is only allowed on surfaces not exceeding the half hectare, except in belts transverse to the slope of the mountain, alternating with similar belts untouched, providing the slope is not at an angle with the horizon greater than 30°, and the earth is not liable to be carried away or furrowed by the descending water.

As soon as the reafforestation of the cleared belts is assured, the same operation may be undertaken in the belts left standing.

Where the slope is greater than 30° or the earth loose and insecure, the improvement or changing of the species shall be made by sowing and covering the seed or planting in furrows.

ART. 2. Where the clearing is done in belts, the old trees are to be extirpated, and all lateral roots which bury themselves too deeply in the under-soil are to be cut, and the trenches thus occasioned are to be filled, first with the larger stones scattered about in the belts undergoing improvements and then with earth; or, where the inclination exceeds the above mentioned limit, or the nature of the soil demands it, the trunks alone will be cut.

ART. 3. In addition to the above rules, the prescriptions of articles 74, 168 and 169 of the laws of March 20, 1865, relating to public works, S. F. No. 2248, for woods bordering on mountain roads, national or provincial, or on the banks of streams and torrents will be observed.

ART. 4. Where or when a proprietor wishes to undertake such operations, he shall give notice to the mayor of the commune in which the forest is situated. In such notice is to be mentioned the period within which the work is to be completed, which in general is not to exceed two years.

The mayor will transmit such notice, with a declaration of the day on which it was received, to the forest committee for the requisite decision at the forest office.

TITLE II.

RULES FOR FORESTS OF LARGE WOODS.

ART. 5. The improvements in these forests may be either by the complete removal of the trunk with stump, or by cutting the trunk, leaving the stump. This will depend upon whether the trees are capable or not of developing themselves again from the stumps and roots left behind; whether the soil is or is not sufficiently firm, and whether the slope is greater or less than an angle of 30° with the horizon.

In case the trunk with the stump is to be removed, the rules given in article 2 will be observed.

ART. 6. The season for the improvements of the forests will be from the first of October to the last of March, except in localities where the snow usually falls early and is late in disappearing, the said period may commence a month earlier and end a month later.

ART. 7. It is permitted, for the purpose of improvement, to cut down the trees standing on an area not exceeding half a hectare, where the condition of the soil and the slope are in accordance with the requirements of the first part of article 1.

ART. 8. Except in the above mentioned case, the improvements are to be made in belts transverse to the slope of the mountain. The size and width of the belt will depend on the degree of the slope and the character of the soil. Thus, in steeper slopes, or less secure soil, the belts must be narrower. The greatest breadth shall not exceed fifty meters of horizontal projection.

ART. 9. Whichever of the two methods for the improvement be adopted to secure the reproduction of the forest, a sufficient number of healthy and vigorous trees, not less than fifty to the hectare, shall be left as sources of seed supply, and these shall only be removed when the reforestation is already secured.

Whenever the proprietor intends to renew the forests by artificial means, he will take the course mentioned in article 4.

ART. 10. When the method of selecting or stripping is adopted, only such trees shall be cut as are sufficiently mature for the purpose of the market, or are weak and defective and hence a source of injury rather than assistance to the forest. All young trees, whose growth is desirable, shall be left restanding.

This shall only occur at certain periods, not annually. If necessary, however, and the extent of the forest permits, the work, instead of being completed at one time, may be divided, and a certain portion performed at fixed intervals or annually.

Trees are in general to be cut above ground, but may also be cut below, if this can be done without injury to the surrounding trees and saplings.

The felling of single trees for urgent wants, such as for bridges, embankments and the like, shall not be considered as an improvement by the method of selection.

ART. 11. In forests where there are clearings, or empty spaces of an extent of $9\frac{1}{2}$ or more square meters, the reforestation of which cannot be expected by natural growth and from chance seed, the proprietor after each cutting shall see that this is brought about either by sowing or transplanting within a period of two years from the last cutting. Resource shall be had to such artificial culture, when three years shall have elapsed since the last cutting without the reforestation having been brought about by the trees left standing for this purpose. From this provision are exempted those cultivated lands not subject to land slides which for a period more or less long have been devoted to purposes of pasture, provided the necessity of this is admitted by the forest committee.

In forests on heavy slopes, exceeding an angle of 40° with the horizon, and in those which protect the inhabitants of the lands below, and public highways, against the descent of earth, stones and the like, the cutting of trees will be limited to those physically mature, and, in case the growth is so thick as to interfere with the proper growth and development of young trees, to such others as may be removed without injury to the efficiency of the forest as a protection from the above-mentioned accidents. Hence the improvement of such forests will be by the method of selection, and the cutting of the trunk, and, further, when the purpose of the forest is to protect against avalanches and the like, the trees shall be cut at a distance of 1.20 meters from the ground.

Trees growing isolated or in small groups on ridges and low but steep and rocky eminences, isolated in their forests, shall be preserved on account of their advantageous position for the dispersion of seed.

ART. 13. Whichever method of improvement be adopted in the utilization of forests, wherever they are adjacent to or cut by deep valleys or ravines, a strip shall be left uncut along the edge at least 15 meters wide, measuring in horizontal projection from the edge towards the interior of the forest. The trees to be cut shall be selected and cut above ground when they have arrived at their maturity.

ART. 14. Likewise the method of selection shall be employed in highwood forests situated on land extending downward from the summit of the mountain or from the superior limit of the growth of trees, for a width of 50 meters in horizontal projection, and the trees shall be cut, either below or above ground, according to the slope of the ground and the character of the soil, as indicated in article 5.

ART. 15. In every method of improvement, whether the trees are cut above or below ground, the logs, if not at once removed from the forest, are to be immediately stripped of their bark.

TITLE III.

IN REGARD TO THINNING OUT.

ART. 16. The thinning out required by a rational silviculture shall be so managed that at the completion the branches just touch in the case of conifers, and in the case of broad-leaved trees, do not intermingle in a space wider than 2.5 meters.

TITLE IV.

CONCERNING PASTURE.

ART. 17. In highwood forests, where all the trees have been cut in certain areas, pasture will not be permitted until the new growth of young trees is sufficiently strong not to be broken down by the animals grazing, and the terminal branches high enough to be in no danger of being bitten off.

Where the method of selection has been employed, pasture may be allowed where the young trees are no longer in danger of losing their terminal buds and branches.

ART. 18. Pasture is forbidden in forests preserved for the purpose of protection, or in the belts or tracts mentioned in articles 12 and 13, as well as those devastated by fire; in these last, temporarily; that is, until they have resumed their former normal state of growth.

ART. 19. Pasture, where allowed, will be for cows, sheep, horses, and also for hogs, but these latter must have an iron ring fastened to their snouts. Goats in general are not permitted to pasture. Exceptionally, however, goats may be admitted when the lack of grazing lands and the pressing of the people (as recognized by the forest committee) render their admission necessary, and the condition of the forests permit it.

The forest office of the district, in concert with the local mayors, will make out annually a list of the places where pasture is permitted for goats, and this list, with the approval of the committee, will be published in the commune.

TITLE V.

FIRES.

ART. 20. In order to preserve the forests from the danger of fires, they will be kept free from chips, &c., resulting from the felling of trees and from all dead wood and fallen branches.

If it be necessary to leave in the forests the wood which has been cut it must be piled up in the empty spaces, and if possible near springs or along streams, or on the sides of roads in their broader parts.

In case of fire, measures will be taken according to its nature and intensity to extinguish it or at least keep it within the narrowest limits possible.

In any case, it will be necessary to clear the ground of all wood and combustible material. The earth should be upturned and a belt of forest towards the wind cut down and a broad ditch dug in order to break the continuity and prevent the fire from assuming larger proportions.

ART. 21. After a fire, if the trees injured by the fire are still capable of growing, the proprietor will prune them in order that new shoots may grow from the trunk, and if the trees are damaged to such an extent that there is no hope of saving them, and the reafforestation of the burned areas cannot be expected if left to themselves, it will be the duty of the proprietor (by means of sowing and transplanting) to see that the reafforestation is brought about, and this within a period of two years, entirely or in part, in case the forest committee, considering the extent of the surface burned over, recognize the necessity of a longer period than two years for the completion of the work.

TITLE VI.

EXTRACTING RESIN.

ART. 22. The extraction of resin from trees growing in forests will only be permitted for such trees as have reached their maturity, and have two or three years to wait before their turn to be cut shall arrive. It will take place in the months of June, July and August.

ART. 23. Bark-peeling is allowed on trees which are to be cut, and which are no longer capable of being reproduced from the stump. The season for it will be in the spring when the sap begins to rise.

TITLE VII.

GATHERING OF LEAVES AND SEEDS IN FORESTS, WHICH ARE DETERIORATING, OR ARE TOO SPARSE—MOWING OF GRASS IN YOUNG WOODS.

ART. 24. In forests which are deteriorating or too sparse, the leaves falling from the trees may be gathered at intervals of not less than two years. For this purpose, the forest, if its extent permits, will be divided into sections, so that one may be used each year.

The leaves will be collected with brooms or wooden rakes, and the parties interested will be held responsible for whatever damage may be done by breaking off or any way injuring young trees which would otherwise have grown.

ART. 25. In the above-mentioned forests it will always be permitted to gather chestnuts, walnuts and the like, and also the seed; but these last only at intervals of two years, and where it is evident that they would otherwise be lost without any advantage to the forest, or where the proprietor shall have taken artificial measures for the improvement of the forest.

ART. 26. The mowing of grass in young woods is only allowed in such as are planted irregularly in rows, and in which the young trees have already become woody.

And the interval shall be at least two years. Only sickles shall be used, and at a distance of not less than 1 decimeter from the trees.

ART. 27. In old forests, where there are no young trees, the gathering of dry leaves, and the mowing of grass, &c., is allowed, the one alternating with the other, and not both in the same year.

TITLE VIII.

DESTRUCTION OF INSECTS.

ART. 28. To prevent the attacks or the diffusion of insects injurious to the forests, in addition to other measures which may be adopted, all unsound trees, and decayed stumps and trunks, shall be removed, as well as all logs, or if it is necessary to keep these, they shall be stripped of their bark.

ART. 29. Where, in spite of such precautionary measures, the forests are attacked by insects, then, after a careful study of the nature and habits of the insects, other more effective measures will be adopted for their destruction, with caterpillars and nests, such as the shaking or breaking down the branches in order to make them fall to the ground, or lighting fires beneath the branches, or fumigating the branches affected with sulphur or the like, or detaching the nests from the branches, or cutting off of the latter, or plowing up the earth in order to break up their tracks; in a word, by employing whatever chemical or mechanical means may seem best adapted to free the forests or, at least, stop the propagation of such insects.

If the measures enumerated or others fail, then it will become necessary to have recourse to the radical measure of cutting down the forest and immediately reducing to charcoal the infected wood.

In the case of the forests thus attacked, the proprietor, as soon as he has ascertained the presence of the injurious insects, shall at once notify the mayor of the locality and the officer of the district, in order that the forest committee may be assembled, and decide upon the measures to be taken to prevent the diffusion.

TITLE IX.

RULES FOR BRUSHWOODS AND RESERVATIONS.

ART. 30. In order to assure the reproduction of deteriorating brushwoods, a certain number of young trees, of the proper age for cutting, at least forty to the hectare, will be left standing, as seed suppliers, or parent trees. The better species will be chosen, preferably seedlings, or where they are lacking, vigorous sproutlings, which have grown from young and well-rooted stumps, and, if possible, at equal distances apart. If the forests are situated in localities where strong winds are prevalent, the trees should be left standing in groups, and their number increased, in order to resist the winds more effectually. Such forests, or rather parent trees, will be spared in future cuttings, and not disturbed until they have borne seed plentifully, and the land is again completely covered with brushwood.

In addition to these reservations, in beechwood forests, all such spouts from stumps, to a distance of 50 centimeters from the base popularly called *alc* as have not attained a diameter of 5 centimeters.

TITLE X.

WOOD CUTTING.

ART. 31. When, after cutting, empty spaces are left of greater extent than 9.50 square meters, the reforestation of which, unaided, cannot rationally be expected, recourse will be had to artificial reforestation in accordance with provisions established for highwood forests in article 12.

ART. 32. The season for wood cutting in brushwood forests will be that already mentioned in article 6. Where the local conditions require a prolongation of time, the forest committee,

recognizing the necessity, may grant it, in which case the prolongation will also hold good for the future. Also in the case of oak brushwood the time for cutting may be extended to the middle of May, in order to admit of the removal of the bark.

TITLE XI.

PASTURE.

ART. 33. Pasture in brushwoods will be permitted when the shoots have reached such a height that the terminal buds are no longer in danger of being bitten off by the animals feeding, wherever they may stand. For the rest, the rules prescribed for highwood forest will also apply here, including that which refers to the species of self-movers.

In woods consisting entirely of rhododendrons, or of mountain elders, as well as those containing some admixture of shrubbery, the pasture of goats also will be permitted.

TITLE XII.

CHARCOAL KILNS.

ART. 34. Charcoal kilns shall be constructed in open spaces already existing, providing these are not near brushwood. In the case that new grounds are to be selected for this purpose, places free from plants and not near such, preferably on the edge of forests, near roads for the transport of the charcoal, in a position sheltered from the winds, and if possible near springs or water-courses.

TITLE XIII.

PREPARATION OF POTASH.

ART. 35. For the preparation of potash by the method of free combustion, a place shall be selected outside of the forest and as sheltered as possible from the wind and near water-courses.

TITLE XIV.

TRANSPORTATION OF WOOD AND CHARCOAL FROM THE FOREST.

ART. 36. Wood and charcoal will be transported from the forests along roads already in existence and care shall be taken not to injure the trees or disturb the surface of the land and all crossing in through tracts of new growth or in reproduction shall be avoided.

Where special circumstances render it necessary to open new roads, the route shall be selected so as to do the least possible damage to the forest, and the parties concerned will be required, as soon as the roads are no longer necessary, to restore the land to its original condition and secure by artificial measures its reforestation, except where it may be found convenient to keep the road for future use. It shall be the duty of the forest committee to determine when such new roads are necessary, as well as whether it is advisable to keep them or destroy them, and in the latter case, to fix the time within which the restoring of the land to its original condition and securing the reforestation shall be accomplished.

TITLE XV.

REGULATIONS FOR MIXED FORESTS.

ART. 37. At the time for cutting the underbrush, all such highwood trees as are deteriorating, stunted in growth, weak, defective, and in general such as no longer have useful growth, shall be likewise felled. Also other trees, which in spite of rational pruning of the branches, cast too much shade and thus interfere with the normal development of the underbrush, shall be included. In this case, the preference will fall upon the older trees, those which disturb the uniformity, the less valuable and likewise the less thriving trees among those of the same age. As a rule, the aim will be to preserve in a forest and as far as possible in equal number all the gradations in age from the underbrush to the trees growing from seed which have reached their maturity and will be the next to be cut.

ART. 38. Where the forest acts as a protection to the inhabitants of the lands beneath and to public highways, the cutting of the brushwood shall be done in alternating transverse belts, and further, only weakly and defective trees are to be included and the aim shall always be to convert the wood gradually into a highwood forest instead of keeping it as a mixed forest.

ART. 39. A certain number of young trees will be left standing at each cutting to take the place of the "parent trees" which, having reached their maturity, are to be felled. In any case, the number will not be less than twenty to the hectare and will be twice that in forests serving as a protection.

ART. 40. In reference to the time of cutting, reafforestation, pasture, charcoal kilns, transport of materials, and all other operations, the regulations made in reference to highwood and brushwood forests will also apply to mixed forests.

TITLE XVI.

PENALTIES.

ART. 41. The above regulations apply to all the forests subject to the provisions of the law, according to their several classes. The non-observance of the same will be punished in conformity with the penal depositions of title third of the forest laws of June 20, 1877, No. 3917, and the provisions of the additional regulations of February 10, 1878, and in cases of reafforestation and of improvement of already existing forests, the proprietor who fails to attend to the sowing and planting within the time fixed, according to article 4, will be held guilty of violation of the laws and will be proceeded against as if he had arbitrarily cut down and cleared off already existing forests.

ART. 42. In accordance with article 44, of the regulations of February 10, 1878, for the application of the forest law, the rate of interest to be employed in calculating the damages for violations of the law is established at £100 for every 4 lire of income.

NAPLES.

REPORT OF CONSUL CAMPHAUSEN.

FOREST REGULATIONS.

The management of the forests in Italy is governed by the general provisions of the forest law of June 30, 1877, supplemented, however, by special regulations for each particular province, which now form an integral part of the law itself.

The fundamental principle of the present forest laws in Italy is directed to the preservation and care of those woods which by their nature, situation and importance, have a direct beneficial influence on the consistency and solidity of the territory, on the disposition of the water supply and on public health. It leaves, therefore, for free cultivation (that is unembarrassed by any trammels of forest regulations) those woods whose deforestation or ploughing up could do no public injury by altering the normal conditions of the regions in the three respects above mentioned. From such fundamental principles it follows that the woods are classed in two categories and published for the purpose of carrying into effect the law in the various communes where the said woods are situated. Wherefore those important woods and

tracts of country which, in the public interest, have been subjected to forest regulations, and are therefore reserved for woodland cultivation, are placed in the category of strict regulation; and those which have no such importance in the eye of the law are placed in the other category and are left to free culture.

In deference to the progress of the age, the said law being conceived in the spirit of most exalted freedom, no privilege is allowed to particular proprietors of woods, which, therefore, are subjected to forest regulations or left free from the same exclusively, according to their importance and utility to the general welfare, and without any distinction of ownership.

To reconcile the principle of considering forests as factors in the public weal, with the exercise of the rights of property, that is to allow the owner the full use of the woodland products of his estate, with reasonable rules tending to the preservation and reproduction of the wood, the law in that act which permits the cutting of timber and allows the ploughing up and agrarian culture even of woods included in the forest regulations, subject to permission and precautions to prevent mischief, has also prescribed for each province the formation of a committee of public interest with powers to regulate the use of fire, excavations of soil, stone, sand, minerals, &c.; the gathering in of forest material, and other operations in the woods, and to prescribe the penalties for contravention of the same.

The execution of the law is confided to the direction of government officials; that is, to departmental inspectors, with jurisdiction over one or more provinces, who, when necessary, have at their disposal sub-inspectors of districts, whose authority extends over the woodland territory of one or more administrative divisions, or even over a whole province, according to the entire extent of the woods therein of their importance and of the possibility of effective superintendence.

The executive part is entrusted to government brigadiers and overseers, and also to provincial brigadiers and overseers, dependent on the government officials. Of those last named the state bears the charge, but the provinces and communes bear the charge of the various grades of employés and of the provincial guards, who are nominated by the prefect of the province, with the consent of the committee on woods and forests, and are appointed for the care of all the woods, indiscriminately, which are subject to forest regulations.

The appointment of the forest officials is in the hands of the ministry, and made by royal decree, after the applicant has undergone three years of special studies at the government college of woods and forests at Vallombrosa, near Florence. The admission of the pupils is regulated by an especial programme of the ministry, and thence their career, their promotion, their assignments and various duties are taken in hand by ministerial instructions for the administration of Italian forests. The nomination of brigadiers and overseers is made by the ministry for the care of those woods belonging to the crown which have been declared inalienable, and which are managed

with a view to obtain timber for civil and public works. From this we see that there are two classes of forest keepers; that is, government brigadiers and overseers for the aforesaid crown woods, and provincial brigadiers and overseers for the (aforesaid) other woods, subject to the forest laws, whatever their ownership, provided that any proprietor is at liberty to have especial guards for the better preservation of his woods, in which case the prefect of the province, at the request of the persons interested, approves the nomination of such private keepers. The chief direction of the service of woods and forests is reserved for the minister of agriculture, who has moreover a council, of which three chief inspectors form a part, whom the minister sends into the departments either for reasons pertaining to the *personnel* of the service or for other interests of the same.

AREA OF FORESTS.

The areas of the forests in the province of Naples amount to 10,870.9008 hectares, of which 8,476.5423 are subject to the forest laws or regulations, and 2,394.3585 free. Of those subject to the forest regulations 340.1136 belong to the crown, 1,820.6140 to corporations and communities, and 6,305.8147 to private owners. Of those woods left for free cultivation 75.6600 are crown lands, 76.5540 belong to corporations and other communities, and 2,242.1445 to private owners.

The privileges and rights of use and service which weigh upon the various communal woods in favor of the rural population of this district consists in the feeding of cattle, the gathering of dead wood, of wild fruits and herbs. However, at the expiration of the present forest law they will be freed from such obligations by means of a compensation derived from the last preceding fall of timber. Goats, however, are rigorously excluded from woods, and can only be allowed to feed in uncultivated spots, or those clothed with useless shrubs, or whenever they cannot possibly do any mischief.

FOREST ADMINISTRATION.

The offices of the inspectors of departments are generally established in the chief towns of the province. They consist of an inspector and a sub-inspector of the same district, who can take the place of the inspector in his absence; of another sub-inspector, with the duties of secretary, and often of one or more sub-inspectors, or pupils, recently from the government college of woods and forests at Vallombrosa, in order that they may learn the practical management of affairs. The inspectors direct the sub-inspectors in all their work, and give them orders tending to improve the service. They also accomplish annually the circuit of the departments, visiting the offices of the sub-inspectors, making recognizances of affairs important to the service; and they assist at the sittings of the committee when they do not think it fit to delegate the sub-inspector of the chief town where the said sitting is held. They fix the place of residence of the movable offices and of the government

keepers, and have postage allowed them in their communications with the minister and with the judicial and other authorities of the department. The district sub-inspectors have their office and residence assigned to them, and communicate post free with the authorities of their district, with the inspector and other officers. The object of their appointment is the preservation and improvement of the woods in their district subject to forest law. To this end, at periods appointed by the inspector, they visit annually the said woods, and especially those which are most mountainous and wild, to ascertain the condition in which they are kept, and the efficiency of the keepers in carrying out their duties, and they suggest to the inspector whatever provisions appear likely to improve the service. They form projects for the restoration of woods, for the cultivation of lands, and they supply information and advice for the contracts and conditions for the letting of woods and the sale of timber. They choose and mark those plants which are to be preserved for purposes of propagation at the fall of timber; they examine and verify the claims for authorization of change of culture in case of lands subject to forest law, and at the end of each year they inform the inspector, by means of statistical reports and prospectuses, of all the service which has been performed during the year in the district, including the decisions given by the judicial authorities in the case of every breach of the forest laws which has been proved by the keepers.

In respect of the revenue of the government forests, it is not possible to obtain any information, inasmuch as in the province of Naples there are no crown woods which are inalienable, which alone in Italy are directly administered by the government in those provinces where such woods are found.

As to the forests in this district which belong either to the crown or to corporations or other communities or to private persons, being all maintained simply with a view to their being fit for cutting timber, they are divided into sections, and one section is cut each year, when their natural growth has arrived at the maturity allowed in each region, according to the purposes for which the timber is used.

When said timber is used for beams, boards or staves of barrels, or other wood-work, the trees are usually cut every fifteen or eighteen years. When it is used for vine poles it is cut every ten or twelve years, and when it is used for barrel hoops, for baskets and other small domestic purposes, then it is cut down every five or seven years. At whatever period the trees are cut fifty trees have to remain on every hectare for purposes of propagation. The trees are cut close to the ground, and with an oblique section, and in season, which, in this province, is allowed from September to March; only in certain elevated and cold situations the committee usually allows, when requested, a prolongation of the season throughout April. The arrangements of the committee for the culture of woods and the fall of timber in this province are based directly on the fundamental premises of the forest laws, and, therefore, in deference to those principles the administration of woods and forests does not concern itself with the pecuniary management of the woods which are

under regulations, whether they be public or private property, and only, when requested, gives its advice as to the conditions of agreements for letting, or the contracts for the sale of timber, limiting its authority to the preservation and improvement of woods. Therefore, the replacing of decayed trunks and the reoccupying of empty spaces are effected by the proprietors by artificial means of planting and sowing, obtaining the seeds and the young plants from the adjacent regions; while for the reafforesting of great tracts of country the proprietors usually request of the minister of agriculture, under the plea of the encouragement of woodland culture, a gratuitous supply of seeds and young plants from the government nurseries.

There are not in this province any schools especially for the study of woodcraft, but this study is encouraged in the chief agrarian college of Portici. The college at Vallombrosa is under the supervision of the minister of agriculture, who directs the qualification of the students to be admitted and the subjects of studies.

DESTRUCTION OF FORESTS.

The decay of woods is deeply lamented, and the minister of agriculture has, in the public interest, turned his attention to the promotion of reafforestation by bringing before the chamber of deputies a project for legislation. The causes of the decay of forests in Italy are many and complex; but the chief of all is the increase of population and the consequent necessity of increasing the area of agrarian cultivation even in unfavorable places. Political changes have rendered it easy for the population to profit by them, and destruction of woods has followed on a vast scale; and on account of the scanty and inefficient forest laws hitherto existing, there was no possibility of restoring the woods which had disappeared. And so, in consequence of the reckless and ignorant tillage of naturally steep and mountainous districts, where good sense would have taught men to increase the woodland vegetation, there followed first an impoverished and meager soil, and by degrees the unsightly, miserable barren rocks, of which the reclothing with woods is now an arduous and costly undertaking.

And even where the total and violent destruction of the woods had not come to pass, it has been necessary by degrees to get rid of the privileges granted and sanctioned by the previous forest laws, which left all woods of private ownership free from administrative surveillance, so that the owners, partly from carelessness and partly being obliged by their circumstances to let, cut down woods out of season, and without leaving trees for the natural propagation of woodland growth, and, lastly, the inconsiderate feeding of goats, with partial clearing, brought about the disappearance of large timber, whose place was ill supplied by decaying, and stained, and spotted plants. And the effects of this imprudence are met with in this province (not only) in the drying up of water springs. In the Island of Capri, where more than elsewhere the woods have been destroyed and replaced by vines, the scarcity of water is so great as to necessitate the transportation of a regular supply from the main land. It was also experienced in 1879 after heavy alluvial inundations, by

which the common lands of Castelmare, Gragnano, S. Agnello, and other places were submerged and buried, because everywhere the woods had been reduced and farms and vineyards have taken their place.

Nothing is known in this province as to reclamation of sand dunes by planting trees. On the other hand, it is known that very many proprietors have asked and obtained from the minister of agriculture gratuitous supplies of young woodland plants raised in the nurseries and plantations of the inalienable government woods, and have transplanted them with very encouraging success into various mountainous localities belonging to them in the province.

TIMBER SUPPLY.

The timber required for the construction of naval and other large public works and that required for cabinet work is imported from abroad, owing to the lack of timber trees in this province. Wood for building and for various domestic and industrial purposes, as well for burning, is provided partly from the neighboring provinces, where there are still preserved some very fine woods of large timber, and partly by the woods in the district.

Timber for naval and other large public works not produced in Italy, is brought here from Russia, Sweden, Trieste, and the west coast of the Adriatic. I have also been informed that most of the lumber used for the boxes in which lemons and oranges are shipped from Sorrento and other places in this vicinity, is brought here from the state of Maine.

No bounty is paid on these importations; nor is there any duty paid on them, but there is a municipal tax paid on all timber and lumber remaining in the city of Naples of 50 centimes (half a lire) on every quintal.

The exportations from this province are staves for tubs and small boards for the construction of small articles.

The most accredited merchants of forest seeds and young plants in this district are the following:

Giordano, Alessandro & Rafaele, Via Torretta a Posilipo, Naples; Fumagalli Brothers, opposite the Botanical Gardens, Naples; Giacomo Sepe, Strada ponte di Chiaia, Naples; Frederick Sepe, Strada monte di Dio Palazzo Trentola, Naples.

EDWARD CAMPHAUSEN,

Consul.

UNITED STATES CONSULATE,

NAPLES, *May 9, 1887.*

The following is the statute containing the general rules laid down by the committee of woods and forests of Naples, according to the provisions of article 4 of the forest law of June 20, 1877, No. 3917, and of article 27 of the law relating thereto of February 10, 1878, No. 4293:

TITLE I.

RULES FOR MAINTAINING THE STRENGTH OF THE SOIL AND THE REPRODUCTION OF TREES.

ARTICLE I. Inasmuch as it is forbidden to destroy or break up the woods in land subject to the forest law, should the proprietor, with the sole view of improving the condition of existing woods, or of changing the kind of forest trees therein, desire to extirpate old trees or

stumps, and to cut up the ground for that purpose, he must make a previous declaration to the committee of forests showing the object that he proposes, the method he wishes to adopt, and the time which he expects to occupy. And of this the committee will give notice to the inspector of forests.

ART. 2. The operations for extirpating old trees and trunks, with the above-mentioned view, must be executed as follows: When the ground slopes not more than ten or fifteen degrees it is divided into continuous and parallel strips in a horizontal direction; those in which operations are to be carried on being not more than 2 meters wide, alternated with others of not less than 6 meters wide, which are to be left untouched. When the proper occupation by trees and the proper condition of the ground are well secured in the strips which are being operated on, a similar method may be carried out in those which were left untouched; but not less than two years after the former operations.

When the wood is situated on the sides of a hill, with a slope of more than fifteen degrees, a strip of not less than 50 meters wide is to be left intact at the top of the mountain, in which, at proper seasons, partial and irregular operations of uprooting and replanting may be carried on; but always in strips, and in such a way as to protect from the wind the young plants in the portions operated on.

TITLE II.

RULES FOR MANAGING LARGE TIMBER TREES—THE CUTTING OF TREES.

ART. 3. The cutting of large timber trees should be carried on by methods called those of propagation and of thinning, the former is used for trees of mature growth, trimming them at fixed periods so as to insure their natural dissemination in the soil, and the protection of the seedlings, according as these require space for their better development.

As a rule, the distance to be preserved clear from the outside extent of one tree to another in large timber, must be about 2 meters. The period of thinning out young plants or seedlings may begin about the third or fourth year of their age, according to the extent of their growth.

Instead of the above method, cutting down to the ground may be carried out in such woods, but always in alternate squares (like a chess-board), called by the French *à bouquet*; or the other method of cutting in horizontal, alternate strips may be used, but always so as not to produce any denudation of the land, and preserving the best plants for propagation, at the rate of at least sixty for each hectare, equidistant from each other, so as to secure their natural dissemination on the soil, and the protection of young plants.

In all cases a wooded zone shall be preserved round the top of hills, of not less than 50 meters wide, in which limit trees must be picked out for cutting with a view to thinning the wood as above stated.

ART. 4. The purging out of useless or parasitical plants in such woods must be done according as the need of it becomes recognized, and always respecting those which bear wood.

ART. 5. In woods which lie on a slope not greater than twenty-five degrees, as well as in those which are included in the forest laws for reasons of public health—with the view of impeding the formation of avalanches, the crumbling down of rocks, and the action of the winds, for the protection of roads and of properties which lie below, as well as the protection of the public health in the adjacent regions—no trees must be cut down except those which have arrived at full maturity, or those which are perished or perishing, when there exists a vigorous young growth fit to take their place; otherwise the mature or decaying trees should be preserved until the young growth has arrived at the said conditions. In woods which are under the forest law, to prevent avalanches, landslips, &c., on the roads and habitations below, trees must only be cut off at the height of a meter from the surface of the ground.

ART. 6. In the case where a wood does not contain trees fit for propagating purposes at the rate of 60 to the hectare, and when there exist empty spaces of 50 square meters which cannot be refurnished by natural dissemination, the proprietor, after each fall of timber, is bound to effect the reoccupation by sowing and planting in a regular manner and according to the circumstances, and when he fails to do so the committee may take steps according to article 17 of the law.

PASTURE.

ART. 7. The admission and feeding of goats is forbidden in all woods. They are limited to rocky and uncultured lands, or those covered with useless shrubs where they cannot do any mischief.

ART. 8. Other animals may be admitted to feed in woods when the young plants have arrived at such a size that they cannot be hurt either by their teeth or their feet.

ART. 9. When a fire breaks out in woods it must be isolated by felling trees and by breaking up the land on the lee side for a space of not less than 20 meters, as well as adopting all means possible for extinguishing it, and for making sure it is not left smouldering under the ashes.

ART. 10. After a fire the owner of a wood is bound to restore it by trimming those trees which, though injured by the fire, have yet life in them, and by sowing and planting to replace those which have been destroyed. The proprietor is allowed two years from the time of the fire, after the lapse of which, if he has not done this, it is regarded as an improper destruction of wood, liable to the penalties prescribed by the forest laws; except when the committee, in consideration of the acreage burnt, and the circumstances of the owner, consider that a further period should be allowed for the completion of the work.

BARKING OF TREES AND EXTRACTION OF RESIN.

ART. 11. Standing timber trees, whether they be leafy or resinous and ligneous, may only be barked when they are destined for cutting in the approaching season. Leafy trees may only be barked in the months of July and August, immediately preceding the cutting. For resinous or ligneous trees the owner may bark them at such times as he may consider it most profitable. Immediately after the felling of trees they must be taken out of the wood, so that the insects which are formed in them may not attack the growing trees. The same care must be taken to remove the separated bark.

ART. 12. Resin must only be extracted from full grown trees and of considerable size and that from April to the end of August.

COLLECTION OF LEAVES, SEEDS AND GRASS.

ART. 13. The gathering of dried leaves and the cutting of grass in the case of old and decaying woods, or those which are poor in young growth, are only permitted at fixed periods of not less than four full years and that without any iron tool.

ART. 14. Grass may be mown in new woods or in those abundant in young growth in the fifth year of the age of the young plants and only with small hand-sickles.

OF INJURIOUS INSECTS.

ART. 15. To prevent the diffusion of insects, injurious to woods, proprietors are bound to clear away all rotten wood lying on the ground, as well as old decaying stumps. As soon as insects make their appearance, means must be taken to prevent their increase, either by beating down with poles the eggs, grubs and nests from infected plants, or else by lighting fires or burning sulphur under them at night. They should be gathered and burnt outside the wood. If these means fail, the prefect, with the consent of the forest officer, should hasten to see that the infected trees are felled, taken out of the wood and carbonized.

ART. 16. As soon as any such insects make their appearance, the proprietor of the wood is bound to inform the local syndic and the district officer of the forest. These in their turn will inform the forest inspector and the prefect of the province, so that the most efficacious means may be put in operation to prevent their diffusion. Failing to give the said information the proprietor is responsible for the injury that may occur to his neighbor's property.

TITLE III.

RULES FOR COPPICE WOODS [BOSCHI CEDUI]—THE CUTTING DOWN OF TREES.

ART. 17. Trees must be cut down close to the ground and with an oblique section, so that the surface of the stump is quite smooth and allows the water to run off freely.

ART. 18. The season for the cutting of these woods, like that prescribed for large timber, is from the beginning of the autumn to the end of winter, so that, without losing sap, vigorous and robust shoots may be obtained.

ART. 19. The number of trees reserved for propagation and for replacing decayed stumps is fifty to the hectare. These cannot be cut down until the third rotation; that is, at the third fall of timber from the time in which they were spared as above, during which time an equal number of new ones must be ready to take their place. The trees thus chosen for propagation must be the finest plants, of at least 24 years old, if possible seedlings, and equidistant from each other. If there is not a sufficient number of seedlings for the purpose, the number may be made up from those which spring from stumps, if they are fit for the purpose.

ART. 20. The custom introduced into this province of cleaning such woods has been maintained. It must be carried out not before the third year after the cutting of the trees and must be limited to the expurgation of plants that are herbaceous, frutiferous or subfrutiferous.

ART. 21. The custom has also been maintained of performing the thinning operation on the stumps in these woods twice before the final cutting; this must be done *secundum artem* and according to the principles of woodcraft, without clearing the plants which have sprung from the same stumps, except that at the second thinning before the final cutting the under branches may be cut; that is, those that spring below the principal boughs on those plants which remain for the final cutting.

ART. 22. The same rules for cutting these copses and for getting rid of the wood thence resulting are to be observed as those indicated for woods of large timber.

PASTURE IN COPPICE WOODS.

ART. 23. The same rules as are contained in articles 7 and 8 are to be observed.

TITLE IV.

OF CHARCOAL PITS AND PREPARATION OF POTASH BOTH IN COPPICES AND WOODS OF LARGE TIMBER.

ART. 24. Carbon pits may be formed in these woods in those parts subjected to cutting and on the old flats already formed there, and new ones may only be formed when there is insufficiency of the old, always choosing by preference the spaces least occupied by trunks and repeating the charcoal burning as much as possible on the same ground.

On beginning to put in action any of these charcoal pits the land must be broken up for a space of two or three meters round and with a palisading on the side toward which the principal winds blow. The owner is responsible for any damage that the trees may suffer. These pits must be set to work immediately after the cutting of trees and the process of charcoal burning must be finished and all cleared away by the month of June next following.

ART. 25. For the preparation of potash the same precautions must be taken as for charcoal pits when the operation is carried on in an open place. When the work is done in pits, these must be filled up with earth and their spaces refurnished by sowing and planting trees within six months. Failing in this, the owner will be liable to legal penalties.

ART. 26. The clearing away of charcoal or of all other ligneous material must be effected by the roads or paths already existing, avoiding those places which have been previously cut or lopped. When it is actually necessary to make new roads for this purpose, care should be taken to cause the least possible injury. In this case, the owner is obliged after the clearance to replace the ground so used in its primitive condition by planting and sowing; failing in which, he may be proceeded against at his own expense as for improper destruction of trees, unless he make a declaration of desiring to retain the new roads for the convenience of future cutting, and this be approved by the forest committee.

TITLE V.

OF COMPOSITE WOODS.

ART. 27. To prevent these from being converted into copses one hundred large timber trees must be left to each hectare, which can only be felled at their complete maturity, that is, when the bud or germinal shoot begins to turn yellow, it must be the care of the owner to see that in the periodical cuttings of the underwood there are always some trees of large timber growth ready to take their places, and in those woods situated on a steep slope or in those places where they are useful to prevent the diffusion of malaria, no large timber trees may be cut down until their full maturity. The proprietor is at liberty to cut the underwood, that is the stools from the bottom of the trunk, when he considers it to his interest, but not before twelve full years, and then in the manner and at the season prescribed for coppices; and when difficulties arise in the management of these woods the committee, with the consent of the district officer and the inspector, shall decide according to the circumstances of the case.

ART. 28. Feeding of animals and the placing of charcoal pits in the composite woods are subject to the same rule as in coppices. For other operations the rules under their respective headings must be observed according as the trees in question are coppice wood or large timber.

TITLE VI.

OF PENALTIES.

ART. 29. The breach of the above by-laws is punishable according to the provisions of the forest law.

ART. 30. The rate of interest to be reckoned for plants cut in contravention is, by article 44 of the general rules for the execution of the forest law, fixed at five per cent. both in table C and table D annexed to the said act.

PALERMO.

REPORT OF CONSUL CARROLL.

In the provinces comprising this district, viz.: Palermo, Girgenti and Trapani, the forests and areas, or extent thereof, together with their real or nominal proprietorships, are as follows:

	Acres.
Palermo—Private.....	9,887½
Government, or in part depending thereon	115,235
Girgenti—Private.....	165
Depending on government	17,245
Trapani—Private.....	22,645
Depending on government.....	4,900

The forests in the province of Girgenti are in the neighborhood of a town called Bivona, and nearly all are owned by the towns of Burgia and Cammarata, which lie adjacent to Bivona.

There are few or no data as to the number and extent of common forests, but it is understood there are forests of this character, the wood and pasture of which the people utilize, not as a privilege, but merely as a tolerance.

The organization of government forest bureaus in Sicily is based on and subject to the general forestry laws of Italy, there being no local laws upon this subject.

In the provinces of Girgenti and Trapani there appears to be no government forests proper. In that of Palermo there are two, viz.: *Ficuzza* and *Sugheri*. The former, although in a very bad condition, being the most extensive and important. *Ficuzza* was formerly the property of the crown. It is about thirty miles from the city of Palermo, and contains about five hundred acres, abounding with old oaks, elms, chestnut trees, &c. Within its grounds are a palace and other buildings incident thereto and its former owners. A new railroad, just opened, passes through or adjacent to it, viz., the Palermo-Corleone.

The annual revenues and expenses of maintaining the forest of *Ficuzza*, and which may serve as a criterion for all others in this district, or in Sicily, perhaps, making due allowance for extent of territory, &c., are as follows:

REVENUES.		EXPENSES.	
Wood.....	\$5,481 40	Wages	\$3,580 00
Pasture	1,114 00	Taxes.....	2,202 00
Wheat, &c.....	2,360 00	Trees	1,020 40
Houses	120 00	Repairs	600 00
Sundries	60 00	Sundries	1,580 00
Total	\$9,135 40	Total	\$8,982 40

Thus it is seen that the actual revenue or gain was only \$153.

In the distant past there were many forests in Sicily, but in consequence of their utter neglect by the government they have now generally disappeared, and miles and miles may be now traveled in certain localities without seeing even a single tree. The government now, however, is considering the feasibility of restoring the ruined forests; and laws, it is understood, have been passed having this object in view, but like nearly all projects in Italy the progress made thus far appears slow or little.

General neglect of the forests by the authorities, and the woodman's axe are among the causes ascribed to their disappearance. Heavy and prolonged rains, which denude the roots of trees, and the drought and excessive heat which follow, may also be mentioned in this connection. Many of the sites of former magnificent forests are now extensive areas of bare rock.

Since the disappearance of the forests rainfalls are diminished and less frequent, as is also of course evaporation, and in general former forest land is sterile.

The reclamation of Mount Pellegrino, contiguous to the city of Palermo, and belonging thereto, is under consideration at this time, but it is thought the reclamation of this mountain will be very difficult, as, with the exception of a small extent thereof, which is covered with a light crust of earth, it is composed of solid rock. Attention will be given to the subject, however, as it matures and progresses, and the result communicated to the Department at the proper time.

The following exhibit will give an idea of the extent of forest area reclaimed, cost of planting trees, &c., in the province of Palermo from the year 1879 to 1883, inclusive:

1879.....	Commenced preparations
1880.....	562½ acres, cost \$1,500.00
1881.....	Nothing done
1882.....	Nothing done
1883.....	386 acres, cost \$1,763.83

From the statements previously made, it is obvious that the supply of Sicilian lumber is meager. There is a tree grown in Sicily called the "*quercus suber*," from which cork is produced. Lumber is imported from Austria, France, England, and Norway, with all of which, excepting France, Italy has a convention or treaty regulating the duty thereon on certain kinds thereof. The duty on lumber varies according to its kind or character. Upon crude or unsawed ebony it is 2 lire (about 40 cents) per quintal or hundred weight; on sawed ebony, 4 lire (about 80 cents) per quintal; on pitch pine and walnut for house-flooring purposes, sawed and planed, 6 lire per quintal; upon ordinary or common lumber of all kinds, crude, 1 lira per quintal, and upon sawed lumber, used in the manufacture of boxes, barrels, &c., 1 lira per hundred weight. The trade therein annually of Palermo is considerable. During the year 1885 it amounted to \$213,403.20, judging from the reports of the imports of this port for that year, on file in the Consulate.

The royal "*Sazione Agzaria*" and the "*Società di Acclimazione*" furnish shoots and seeds free of charge, and also the "*Vitis Americana*," a prophylactic against Phylloxera. These are government institutions and are managed by the best talent in the country, and reflect great credit on the present government of Italy. It is understood there are no private concerns or persons engaged to any extent in the seed or shoot business in this part of Italy.

As previously intimated, there are no forest laws for this district, the forests therein being subject to the general law of Italy in the premises.

As to forests, the following books have been published on the subject and are very instructive, viz: "*Notizie Sulle Condizioni dell' Agricoltura in Italia*" (eleven volumes), 1870 to 1885; "*Inchiesta Agraria*," relative to Sicily, in two volumes; "*Notizie intorno ai boschi e terreni soggetti al Vincolo forestale nel quinquennio*," 1879 to 1883; Rome, 1886.

Referring to forests in general, I find, in reading upon the subject, that those of Sicily were formerly remarkable for their extent and magnificence. It was the Sicilian forests which furnished the splendid ship building timber during the dominance of the island by the Greeks and Saracens. Those forests, however, have been rapidly disappearing since the fifteenth or sixteenth century, and it is understood the ravages of the present century have made more havoc therein than any of its predecessors.

I find from statistics that in 1857 the total area of forests in Sicily was estimated to be about 172,000 acres. The opinion now obtains that this acreage has considerably decreased, but it is thought the interest the government has manifested in the restoration of forests will check further destruction

thereof. At the time referred to the forests of Mount Etna alone are said to have covered 125,000 acres; now, however, the whole province of Catania, in which Etna is situated, is believed to contain only about 55,000 acres.

The most extensive forests at present are "*Etna*," "*Caronian*," and "*Ficuzza*," the latter of which I have previously referred to. It was in this forest the Bourbon kings formerly hunted during their reign or residence in Palermo, which is, as stated, about thirty miles therefrom.

PHILIP CARROLL,
Consul.

UNITED STATES CONSULATE,
PALERMO, *January 25, 1887.*

SWITZERLAND.

REPORT OF CONSUL-GENERAL WINCHESTER.

GREAT and increasing attention is paid in Switzerland to forest culture and forest preservation.

Two considerations have chiefly operated to produce its importance if not its necessity: One, the influence in checking the sudden and disastrous floods so common in the mountain streams; the other, the protection and maintenance of the steep hillsides which constitute so large a portion of the agricultural area of the country. From time immemorial almost all the mountain cantons possessed forest laws, but it was not until the revision of the federal constitution in 1874 that the federal assembly by virtue of article 24 of the constitution enacted the law of March 24, 1876, assuming federal supervision of the whole question, and it is now regarded as a matter of paramount national importance. The commercial management is subjected by the federal law to state inspection.

It is the duty of the forest department to give advice and point out the necessity of renewal, replanting and maintenance of trees sufficient for shelter or protection against avalanches, earth-slopes and falls of rock. The communal forests are managed by the council, who employ wood-rangers, qualified by examination or training in the state forestry schools, and even on the mountain side, apparently but a forbidding rock, by constant, careful and scientific attention are found oak, beech, birch and pine in large quantities and of respectable dimensions.

By the last report, embracing 1885, Switzerland contained the following forest areas: State forest, 32,995 hectares, or 4.20 per cent.; commune and corporation forest, 520,183 hectares, or 66.23 per cent.; private forest, 232,196 hectares, or 29.57 per cent.; total, 785,374 hectares.

The canton of Berne had: State forest, 11,050 hectares, or 7.68 per cent.; commune and corporation forest, 77,410 hectares, or 53.84 per cent.; private forest, 55,320 hectares, or 38.48 per cent.; total, 143,780 hectares, or 20.87 per cent.

In some communes, after a provision of wood has been set apart for such public purposes as construction, repairs and heating of schools, churches and communal buildings, an allotment is made to every citizen householder. Extra timber, to be paid for, may be allotted on application for any special purpose, but it must be used within a fixed time for the special purpose and no other, under a heavy penalty.

In all communes the citizens, so far as possessed of communal rights, can determine and control in their local assemblies the distribution of wood. As to the administration, purchase and sale of forests the government exercises a supervision, and is vigilant in guarding the interest of posterity by preserving forest capital and forest benefits, as far as practicable, unimpaired.

Private forest interests are regulated to the extent of requiring a new planting to be made whenever there is clearing done.

The new planting does not necessarily cover the same area in extent as the clearing, but is a matter in the discretion of the forest department.

PASTURE RIGHTS.

Pasture in the forest is only permitted when the tops of the trees cannot be reached by the stock. As a rule every citizen who is also a householder has a right to put on the commune pastures, which are usually available from June to September, a certain number of cattle and sheep. The pastures would not be sufficient if every one put on his full quota, but the grazing season being short and the winters long the quantity of stock that can be kept on the commune is limited to what can be supported in winter.

For each head of cattle depastured one franc must be paid to the municipality and one day's work given to repairing fences, roads, &c. For every sheep ten centimes are paid. The owner may attend his own cattle, or he may hire the milch cattle to others; or he may put these under charge of the communal herd for a small payment; but no citizen can let or sell his right to pasture, nor can cattle not belonging to citizens be hired and put on the pastures.

The communal council cannot impose more than a certain amount of taxation, nor sell on mortgage these commune forests and pastures without permission of the council of state. It is seen, therefore, that every citizen who is also a householder has, besides his individual property, an inalienable right to the use of the communal pastures, and to at least as much wood as will supply his necessary wants. He cannot divest himself of these rights by sale, letting, or mortgage, and so far as these are valuable he is insured against abject pauperism.

FEDERAL ADMINISTRATION.

There is a federal bureau of forestry, known as the third division of the department of commerce and agriculture, that assumes direct management of

the federal forest districts (mountains or Alps), and the forests outside of this district are under the control of the respective cantonal governments. The federal forest inspector is vested with the power to see to the observance and enforcement of the forest police laws and regulations both of the confederation and the cantons. In all the cantons, with the exception of Basle Land, Basle City, and Geneva, there is a chief forester, under whom the entire administration is placed. In addition to him nearly every large city and commune have special skilled and educated foresters, for the more careful attention to their local forests. All, however, are subject to the orders and the immediate direction of the cantonal chief forester, as he is subject to the authority of the federal department of forestry.

FINANCIAL ADMINISTRATION.

The Swiss Confederation derives no revenues from forests. It does not possess any forests, but has undertaken in certain districts the administration of the forest laws, and while reserving as to all some general controlling power, intrusts to state and local authorities the enactment and execution of their own forest laws. The cantons own but a small portion of the forests, the greater part being the property of communes, corporations and private individuals. The quantity of wood which can be taken annually from these forests with a proper regard to their efficient preservation, in all of its varied purposes, is estimated at 2,789,000 cubic meters.

Of this is credited to the state forests, 156,000; to the commune and corporation forests, 1,859,000, and to private forests 774,000.

The amount permitted to be taken per hectare, or for every 10,000 square meters, from the state forests, is 4.75 cubic meters; for the commune and corporation, 3.57 cubic meters, and from the private forests, 3.37 cubic meters, or an average of 3.57 cubic meters. From the total wood taken annually 40 per cent. is for lumber and 60 per cent. for fuel. The first has an average value of 16 francs per cubic meter, the other of 9.25 francs; the total value of wood taken from the forests amounting therefore to 33,179,000 francs, at 11.92 francs per cubic meter, and yielding 42.13 francs per hectare.

The above estimates apply to the wood in the forests.

The income from the state forests of the canton of Berne, with a ground valuation of 13,500,000 francs, amounts to 700,000 francs. From this, however, must be deducted the following items: For harvest expenses, 136,000 francs; supervision of forest, 35,000 francs; cultivation, 21,000 francs; roads and supports, 28,000 francs; taxes to the state and commune, 86,000 francs; administration, 55,000 francs; total expenses, 361,000 francs; leaving a balance of 339,000 francs as a net income.

PLANTING OF TREES.

Since the federal forest law was passed, covering the years 1878-1885, inclusive, there have been used for new planting in the federal forest district pine and non-foliage shoots, of which there are some eleven varieties, 42,197,796.

or an annual average of 5,263,474, and of foliage or leaf shoots, consisting of a very great variety, 2,811,439, or annually 351,430. These new plantings included 4,668,332 shoots and 855 kilograms (a kilogram equals 2 pounds) of seeds, which were used for the foundation of 175 new forests, embracing an area of 700 hectares. The cost of these new plantings is estimated at 230,380 francs. Other improvements in the sum of 317,015 francs were made:

1. Earth-works, 9,507 meters long, and 4,108 cubic meter contents.
2. Stone-work and other masonry, 9,987 meters long, and 22,089 cubic contents.
3. Wood-work, 194,532 meters long, and 365,396 cubic contents.

The federal contribution to the costs of these new plantings and improvements was 258,462 francs; that is, 30 to 70 per cent. of the entire cost of the new plantings, which were required for protection against landslides, avalanches, &c., and 20 to 50 per cent. for new plantings involving other public interests and safeguards.

As to the methods but a slight idea can be given, as the full details would be too voluminous for such a report. First, the ground is prepared for the seed, which is sown, and after two years the shoots are planted in rows at such distance to admit light and any needed cultivation. In two or three years they are transplanted in the forest reservations from 1 to 2 meters apart, according to the soil and character of the plant. Each plant is carefully looked after and scientifically pruned and trained, each having its fair share of space and light. Bounties are not paid in Switzerland.

SCHOOLS OF FORESTRY.

The polytechnical school, a federal institution, at Zurich, has a department devoted to forestry, from which is supplied a large body of thoroughly educated foresters. The course of study is of the most advanced character, and is completed in three years. Under the federal forest law the government extends, as it sees fit, assistance to organizations in the federal forest districts for the promotion of technical forestry. Of these local and primary forest schools there are many, having spring and autumn terms of three to four weeks each.

By a federal law of March, 1885, there was added to the forest department of the polytechnic at Zurich a school for forest experiments, connected with meteorological stations, thereby supplementing the already excellent school with the means of accurate scientific and regular meteorological observations, and their close and important alliance with matters of forest culture.

FOREST PROTECTION.

The destruction of forests is well safeguarded by the federal law of March, 1876, and previous to its enactment most of the cantons had rigid state laws against any dangerous clearing of the forests. As a rule, any person, commune, or corporation wishing to make a clearing must obtain the consent of the forest director, or if the proposed clearing is included in whole or part

within the federal forest district the assent of the proper government officials is required. As a condition to the granting of the permission, the parties must either replant the clearing with shoots or pay a sum sufficient to have it done. There are no sand-dunes in Switzerland, and the waste places are few, being either small swamps or the mountain-sides. Many of the latter, under federal subsidy, by the construction of stone and other guards, are being brought into forest cultivation, mainly to form a natural and permanent shelter from avalanches and rock slides, so common and destructive in some localities.

LUMBER TRADE.

In regard to the Swiss lumber trade no domestic statistics can be found. The exports and imports for 1885, the last reports made, show:

Articles.	Imports.		Exports.	
	Quantity.	Value.	Quantity.	Value.
	<i>M. centner.</i>	<i>Francs.</i>	<i>M. centner.</i>	<i>Francs.</i>
Firewood.....	965,750	2,414,375	270,584	526,735
Lumber for building purposes of all kinds, not dressed.....	212,816	851,264	512,787	2,126,910
Dressed lumber.....	351,996	2,500,341	591,712	3,787,926
Charcoal.....	56,010	504,090	31,379	237,487
Total.....	1,586,572	6,270,070	1,406,462	6,679,058

It will be observed that the imports exceed by a small amount the exports, the result of the large importation of firewood, which constitutes almost the exclusive fuel of Switzerland, which has no coal mines, and the wood is imported at a less cost than coal. The exports of valuable lumber for building and manufacture show a large balance in favor of Switzerland.

The export lumber trade is mostly with France and Italy; the importation, from Germany and Austria.

Import duty: Brushwood, bark, and tanning bark, 2 centimes per metric centner; building wood, axe-hewed, willow and vine-props, 5 centimes per metric centner; sawed lumber and shingles, 40 centimes per metric centner; dressed building lumber, 60 centimes per metric centner.

Export duty: Wood, rough or hewed, and charcoal are free.

DEALERS IN SEED, ETC.

Seeds are procured and sold by private firms, of which the following leading ones may be named: Titus, Durr & Co., Zurich; Chr. Heinze, Langnan, Berne; John Berrge, Obergeehen, Argovie.

Shoots are distributed generally by the cantons, the larger communes, and the various forest administrations, located as follows:

The forest administration for the Canton of Berne, at Berne.

The city forest office at Winterthur, Canton of Zurich.

The city forest administration at Zofingen, Canton of Argovie.

The Canton of Berne at present has no uniform forest law, but is engaged in digesting and codifying one.

The foregoing report is necessarily very fragmentary and incomplete from the various and extensive ground covered by the series of questions submitted and the inexhaustible mass of federal and cantonal legislation bearing on the subject of forest culture and preservation.

It is respectfully submitted, with the hope that the Department may be enabled from the results of its inquiry to favorably present not only to the consideration of our General and State Governments, but to the many persons of fortune in the United States who are addicted to the practice of agriculture as a sort of serious amusement, devoting themselves to the rearing of purely-bred stock, that forestry presents a field for their enterprise both interesting and useful. Why should it not be quite as fascinating to watch the development of a collection of trees as that of a herd or flock? And aside from the personal gratification, a man of public spirit can be assured that he is making helpful additions to the sum of experimental knowledge on a most important subject. It is rapidly becoming, in the vast and treeless West, a profitable business enterprise, sought by many as a permanent investment. It is in that section of our country that sylviculture and forest management are being recognized as of paramount interest.

It is true that land-holders who are accustomed to garner crops in a hundred days from planting have a natural shrinking from seed which may not mature a crop in a hundred years. But it can be shown that growing wood on waste land enhances the value of the remainder of the farm by more than the planting and care have cost; that the first installment of a forest crop is not so remote as is generally believed; that the tree growth enriches rather than impoverishes the ground, and that the best varieties of wood can be grown as easily as the poorest, while the demand for forest products is rapidly becoming more urgent; that forestry not only beautifies the farm, but between woodland and plowland is restored that balance which must be preserved to insure the most equable distribution of moisture and climatic conditions most favorable to the productiveness of the soil and the better health of the people.

BOYD WINCHESTER,

Consul-General.

UNITED STATES CONSULATE-GENERAL,

BERNE, *January 14, 1887.*

ZURICH.

REPORT OF CONSUL CATLIN.

For no country in the world is the subject of forestry invested with a greater importance than for Switzerland, the land of crag and torrent, where every streamlet may, unless its flow be regulated and controlled, become in an incredibly short time a raging torrent, leaving death and destruction in its path, or where the careless cutting away of a few trees from a hillside, is almost certain to bring down an avalanche of earth and rock sufficient, as in the case

of the memorable land-slides at Goldau in 1806, or at Elm in 1881, to engulf entire villages, destroy many human lives, and convert smiling valleys into scenes of barren desolation and ruin.

Another memorable avalanche was that which occurred on the 31st of May, 1879, at Fontana, in Canton Tessin, destroying the church, the town-house, a dwelling and two barns, and costing the lives of an entire family. On this occasion, within a space of five minutes, no less than 350,000 cubic meters of earth and rock came down from a height of 4,300 feet upon the devoted village, and the ruin which it wrought is vividly portrayed in the accompanying sketches, placed at my disposal by the federal chief inspector of forestry, Mr. J. Coaz, in whose admirable work, "*Die Lawinen der Schweizer Alpen*," they originally appeared.

An exceptionally curious avalanche was that which on the morning of May 1, 1879, came rushing down the westerly slope of the Jungfrau into the Lauterbrunn Valley, a distance of about 7,000 feet. Its peculiar feature was, that not only along its course but even on the opposite side of the valley, 1,200 feet away, the atmospheric pressure which its rapid movement generated was so great as to level entire forests. The effect is vividly delineated in the accompanying view taken from the work above mentioned.

Since commencing the preparation of this report I have clipped from the *Neue Züricher Zeitung*, of this city (November 15, 1886), a report, of which the following is a translation:

From Altorf.—On Friday evening several blocks of rock detached themselves from a bare crag and fell, one of them passing entirely through a house. The inmates, who had already retired to rest, were buried in the ruins, but on crying for help, were taken out uninjured. Altogether, the weight of fallen rock is estimated at 1,000 centners [about a ton]. The family room and the entire front of the house known as the "*Nussbäumli*" were torn clean away. Since Friday no further fall has been reported. *The cutting away of the woods is the supposed cause of the disaster.*

A BRIEF RETROSPECT.

Early in the fourteenth century, in the more thickly populated sections of Switzerland, the people appear to have been forced, through apprehension of a deficiency in their wood supply, to take some measures for the preservation of their forests. In the year 1314 Zurich forbade its foresters (*vorsters*) to "fell, raft or sell wood from the Sihlwald." In 1339 Schwyz issued a prohibition against charcoal burning, and in 1438 Freiburg decreed that no wood should be cut in the environs of the city. In Entlebuch it was forbidden in 1471 "to draw wood from forests situated high up in the mountains," and in 1592 Berne called attention to the need of economy in the use of wood. Finally similar decrees became general, but while serving to preserve forest areas they proved a hindrance to the progress of agricultural and vine-growing interests. Zurich, for instance, in 1563, forbade the establishment of any new vineyards, and the prohibition was kept in force up to the beginning of the eighteenth century. At that period the dread of a deficiency of wood became so general that it was even forbidden to purvey

or export any of it from one village to another. Contemporaneously with these prohibitions were issued others forbidding the pasturage of cattle, sheep and goats in the forests. The old law generally ran in some such homely text as this:

Whoever keeps a cow at home in summer is allowed to drive no goats, and nobody more than he actually requires for his house-keeping.

But spite of all these precautions and prohibitive measures the lack of combined action became painfully apparent. Moreover the individual owners were refractory, resented interference, and held on to their woodlands, so that, in fact, to-day the comparatively small forest area belonging to the state is what has principally been acquired by direct purchase, by inheritance or by the suppression of monasteries, as in the Bernese Jura, in Thurgau and in Schaffhausen.

With the advent, however of the eighteenth century Swiss forestry took on, in an official sense at least, a more active existence. In 1702 Zurich, always foremost in the work, appointed a commission to devise a general forestry system. In 1825 Berne followed suit, and later Freiburg, Lucerne and Schwyz took action in the same direction. From this time on the several cantons managed their own forestry matters as they wished, and entirely independent of each other up to ten years ago, when the imperative needs of combined action having become apparent the matter was taken in hand by the federal authorities, whose attention had been called to the pressing demand for legislative action to arrest the destruction of forests, especially in the higher mountain regions. Accordingly, on the 24th of March, 1876, a law was passed establishing federal control over the forests in all the mountain regions of Switzerland, embracing eight entire cantons, viz., Appenzell, Glarus Graubunden, Schwyz, Tessin, Unterwalden, Uri and Valais, and parts of seven others, viz., Berne, 41.48 per cent.; Freiburg, 32.70 per cent.; Lucerne, 53.50 per cent.; St. Gallen, 76.17 per cent.; Waadt, 22.98 per cent.; Zug, — per cent.; and Zurich, 6.86 per cent.

ZURICH'S FOREST SYSTEM.

As will be observed from the foregoing, Zurich has always evinced an actual and especial interest in forestry matters, and the result is that her forestry system at the present day is a model one, and is so regarded throughout Switzerland. Her forestry law, which has been in operation in its present form for over a quarter of a century, is so complete in every detail as to form a report in itself, and I have therefore translated it and incorporated it in full herewith.

I.—ORGANIZATION.

1. Cantonal, township, and corporation forests shall be subject to the control of the government forestry system. Private forests come under the same provision, in so far as the safety of the others or regard for a common danger renders necessary.

2. According to article 49 of the law pertaining to the organization of the government council, supreme control of the forestry system is vested in the direction of the interior. A yearly sum of 8,000 francs will be allowed it for the cost of management, and for the interests

of forest culture, as, for instance, in the award of premiums for distinguished services, establishment of a course of instruction for foresters, &c.

3. The canton is divided into four forestry districts, the limits of which shall be fixed by the council.

4. The cantonal forestry board shall consist of one overforestermaster and four district forestmasters. The council is authorized to furnish an adjunct thereto. In said board is vested the duty of superintending all forestry affairs. The maintenance of the cantonal forests, under control of the director of finance, is also transferred to it. The duties of its members will be especially determined by official instructions from the council.

5. Only those who shall have passed a government examination, as prescribed by the council, and have been declared competent by the direction of the interior, shall be employed as forestry officials.

6. The overforestermaster, the district forestmasters, and the adjunct shall be chosen by the council on the simple, though not binding, nomination of the direction of the interior. The term of service of the over and district forestmasters shall be for three years. The adjunct shall be chosen for a period to be fixed by the council. Retiring officers are eligible for reelection.

7. The overforestermaster receives a salary of 3,500 francs. When traveling on official business, his cash outlays will be reimbursed. The further sum of 1,000 francs is allowed for clerk and office expenses.

8. District forestmasters receive an annual salary of 2,200 francs. While on official journeys on forest service, they receive a daily allowance of 10 francs, and while on official journeys, in the interest of cantonal forests, a daily allowance to be determined by the council.

9. The council shall fix the sum to be paid to the adjunct out of the appropriation provided in article 2.

10. The daily allowances, when involving cash outlays, shall be paid from the cantonal forestry fund or from the appropriation provided in article 2, depending on whether they concern business connected with the cantonal or non-cantonal forests.

11. Forestry officials are required to give bonds in the amounts to be determined by the council.

12. Each corporation shall elect a board of overseers of not less than three members, for a period of three years, and shall give notice of such election to the directors of the interior.

13. The employment of foresters is obligatory upon (a) the canton for all forests directly or indirectly belonging to it, (b) all forest-owning townships, and (c) wood corporations. Townships and corporations are directed to appoint an overforester. Several townships or corporations may unite on one and the same person for this purpose. Forestry officials appointed by townships and corporations, are at the same time subordinate to the cantonal forestry officials in matters pertaining to cantonal forests.

14. Townships, corporations, and private owners are to pay the salaries of forestry officers appointed by them. Where the forests of a township or corporation are so small that such salary does not amount to 100 francs, then the township or corporation in question shall unite with one or several neighboring townships or corporations to appoint a forester in common. The proper method of procedure in such case shall be determined by the direction of the interior.

15. Cantonal foresters shall be chosen by the direction of finance on the simple, though not binding, nomination of the overforestermaster. The choice of township and corporation overforesters and foresters is vested in the boards of overseers, which may for this purpose be increased to six or eight members. The term of service for overforesters and foresters shall be three years. Elections shall always be held after the renewal of the board of overseers. Retiring members are eligible for reelection. This period of service takes effect in individual cases from the first election held after the promulgation of this law.

16. The providing of foresters for private forests is left to the owners. But in case a forest district is adjacent, the owner may decide upon the appointment of a forester and be present at his election, at which the minority must submit and assume its proportional share

of the salary. The proportional voice in voting, as well as in paying, shall be determined on a ratio of the area represented. Private individuals may, with the consent of the township or corporations, transfer to the latter's foresters the care of their forests, in which case they shall arrange with said township or corporation what they are to pay.

17. Applicants for the position of overforester must furnish proof of their competency in the form of an essay to be submitted to the overforestermaster. Special instructions as to the nature of such essay will be furnished in an order from the direction of the interior. As conditions of eligibility as forester, active citizenship, a good physical constitution, and a knowledge of reading, writing, and arithmetic will be required.

18. Elections of overforesters and foresters by boards of overseers of townships and corporations are subject to examination and confirmation by the direction of the interior. To this end certificates stating the manner of election, name, age, and former employment of the candidate, and the annual salary pertaining to the position, shall be forwarded, through the statthalter's offices, to the direction of the interior. The examination by the latter covers in part the validity of the elections and in part the existence of the lawful qualifications, and it is ordered that confirmation be withheld where a candidate has previously been convicted of serious violations of or misdemeanors against forestry regulations. After confirmation the newly-elected candidate is ordered to be sworn (oaths are no longer administered, the "hand vow," as it is called, having been substituted), which duty is to be performed by the statthalter's office. Private owners appointing foresters must have them sworn by the statthalter's office.

19. Sworn forestry employ  s stand, in regard to the performance of police duties, on an equal footing with police employ  s. The same official credit is consequently to be accorded to their reports, made under the provisions of article 96 and the following articles of this law, as would be accorded to the same if made by the police officers.

20. It shall be the duty of foresters in the cantonal, township, and corporation forests to attend a course of instruction on the subject of forestry, to be provided by the direction of the interior and imparted by the forestmasters. They may be required by the direction of the interior to attend a second course when a previous examination shall have proved unsatisfactory. They receive their service instructions from the direction of the interior. Foresters in private forests shall be allowed to participate in the courses of instruction referred to.

21. The consent of the direction of the interior is necessary whenever the overforestermaster, forestmasters, or foresters in cantonal forests desire to fill any other official position or follow any other pursuit in conjunction with their position as stated. Overforesters and foresters in township and corporation forests cannot at the same time be members of their election boards. Before entering upon any other township office or service they must procure the consent of the direction of the interior.

22. The following of any business in wood or manufactured woodenware, or of any industry in which wood is the leading material, is unconditionally forbidden for all persons in the cantonal, township, and corporation forestry service.

II.—MAINTENANCE OF FORESTS.

A.—General regulations.

23. Cantonal, township, and corporation forests shall be stringently maintained, and the plans therefor shall be elaborated in accordance with this principal decree. For insuring the area and the establishment of an assured plan of maintenance for the same, these forests shall be marked off and surveyed according to existing regulations for that purpose.

24. Where cantonal, township, or corporation forests border upon others, it shall be the duty of each adjacent owner to keep open a common line of demarkation at least 3 feet in width, to which each shall contribute one-half, and so laid out that each stone post can easily be seen from the other. In order that this may also be possible where the forest borders on a meadow or other piece of land, the border line must always be kept clear. The stone posting must be carefully maintained, and where border marks are lacking they must at once be replaced.

25. All cultivable barrens, as well as all clearings devoid of adequate natural growth, shall be promptly replanted.

26. In central forests the upper branches are to be kept up, with a view to promoting their growth as well as circumstances will permit, and upon the special recommendation of the forestmaster.

27. The irregular chopping down of trees all through a forest is, in the larger forests, where chopping is possible, only permitted in exceptional cases and when circumstances render it necessary; otherwise it is entirely prohibited. The establishment of barren clearings is also prohibited when it endangers the safety of the ground or tends to climatic disadvantages.

28. All clearings, unless special circumstances suggest a deviation from the rule, are to be made as nearly as possible in unbroken parallel lines, and in such a manner that the trees left standing shall be best protected from damage by wind.

29. In sown spots and clearings on steep mountain slopes, where there is a fear of landslides, stumps shall not be dug out without consent of the forestmaster.

30. The regulation concerning the immediate replanting of cultivable barrens and insufficiently planted clearings, as well as the prohibition against barren clearings and digging out of stumps, applies also to such private forests the digging up or clearing of which might entail consequences of common danger, such as loosening of the earth, &c. The owner of such a forest is, moreover, bound to establish and maintain a proper system of drainage.

31. The removal of weeds and rotten wood and the trimming up of the forest must, under all circumstances, be done as soon and as often as necessary, in order, through the former, to diminish the hindrances to the growth of the wood, and, through the latter, to avoid injurious pressure upon the growth of the principal trees.

32. Thinning out must be confined to the removal of dead branches, and to such parts of the branches as exert an injurious effect upon the front and upper growth.

33. As osier twigs only the following are to be cut, viz:

(a) Willow, hazel and other twigs from young forests.

(b) Bent trees of all kinds, not over six years old in lower or twelve years old in upper forests.

The cutting shall be done under police supervision, as prescribed in article 59.

34. Cuttings for pine brooms shall only be taken from the loose wood from the clearing and trimming of the forest. It is forbidden to take cuttings for birch brooms from the upper boughs or outside of wood coming from clearing and trimming.

35. The pursuit of kindred forest uses (pasturage, leaf-gathering, &c.) is only followed under the conditions provided in articles 58 and 61-67. This should at no time involve any risk to the wood yield.

B.—Special regulations concerning cantonal forests.

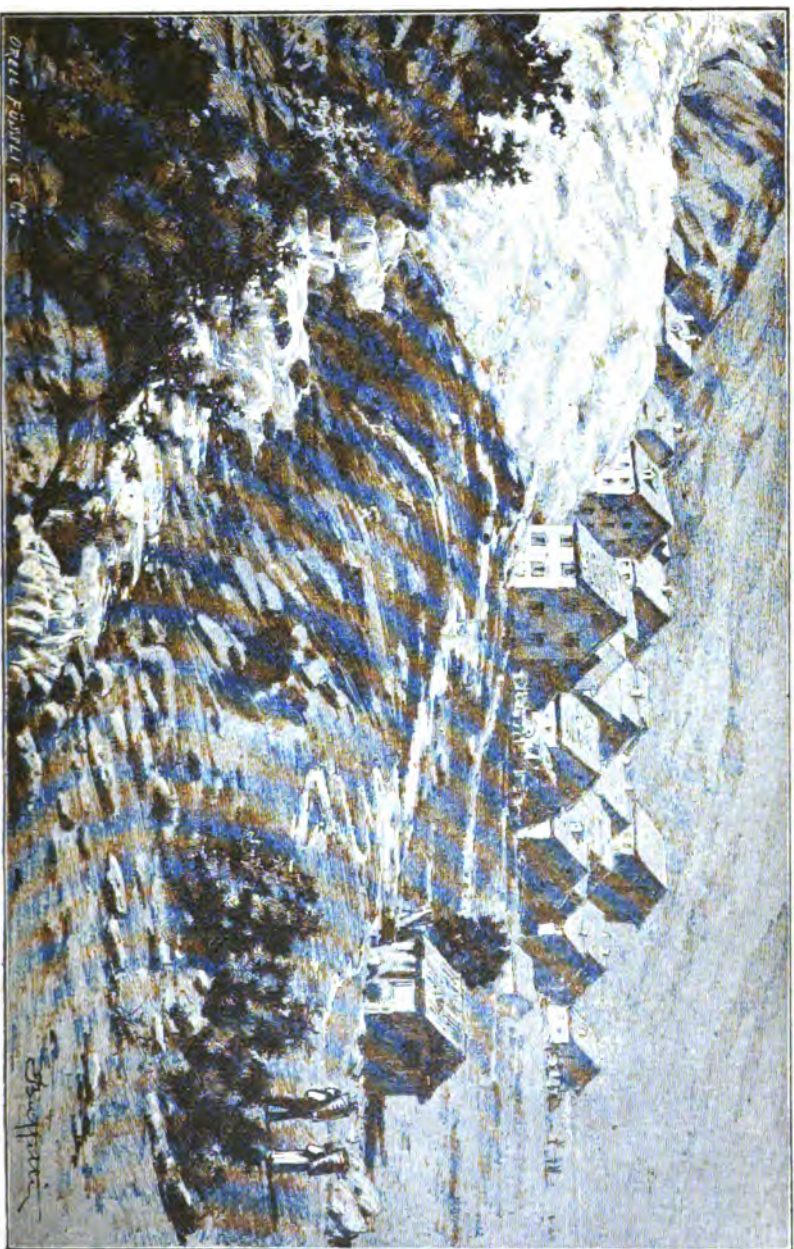
36. Plans for the cultivation of cantonal forests must be based upon a careful estimate of their yield.

37. The sale of forest products shall generally be conducted at public auctions, according to rules prescribed by the direction of finance.

C.—Special regulations concerning township and corporation forests.

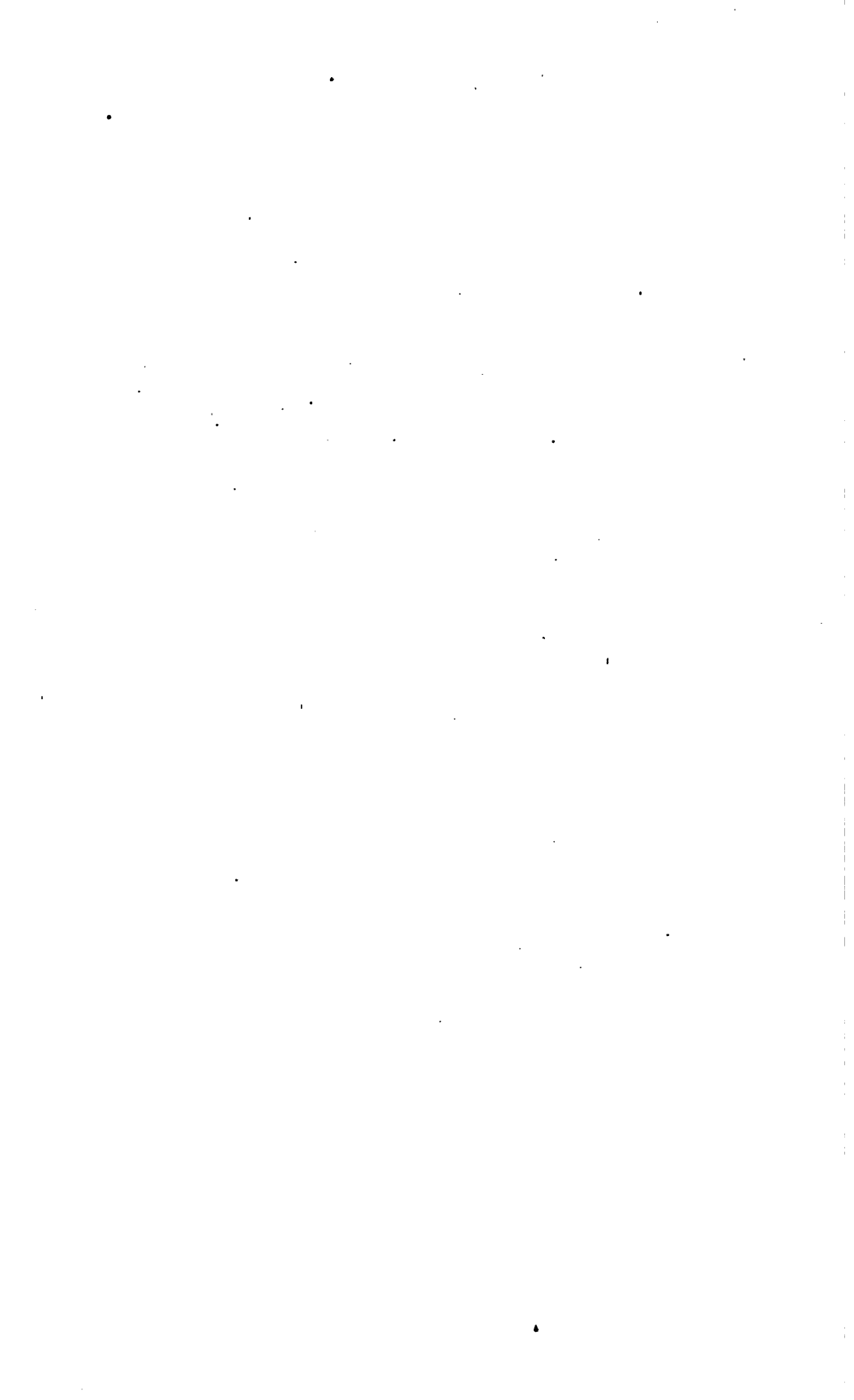
38. Township and corporation forests shall be maintained as prescribed in article 23. The plans for such a maintenance, which will be prepared by the district forestmasters, with a view to the requirements of the owners interested and on the basis of a previous survey, are, after acceptance by the boards of overseers and examination by the overforester, subject to approval by the direction of the interior.

39. The canton contributes a sum not to exceed one-half of the regular tariff cost toward the expense of surveys ordered by the direction of the interior for forestry purposes, provided such surveys are carried out as required by law. The expense of any subsequent surveys which may be necessitated by changes of area or revision of boundaries is borne by the owner.



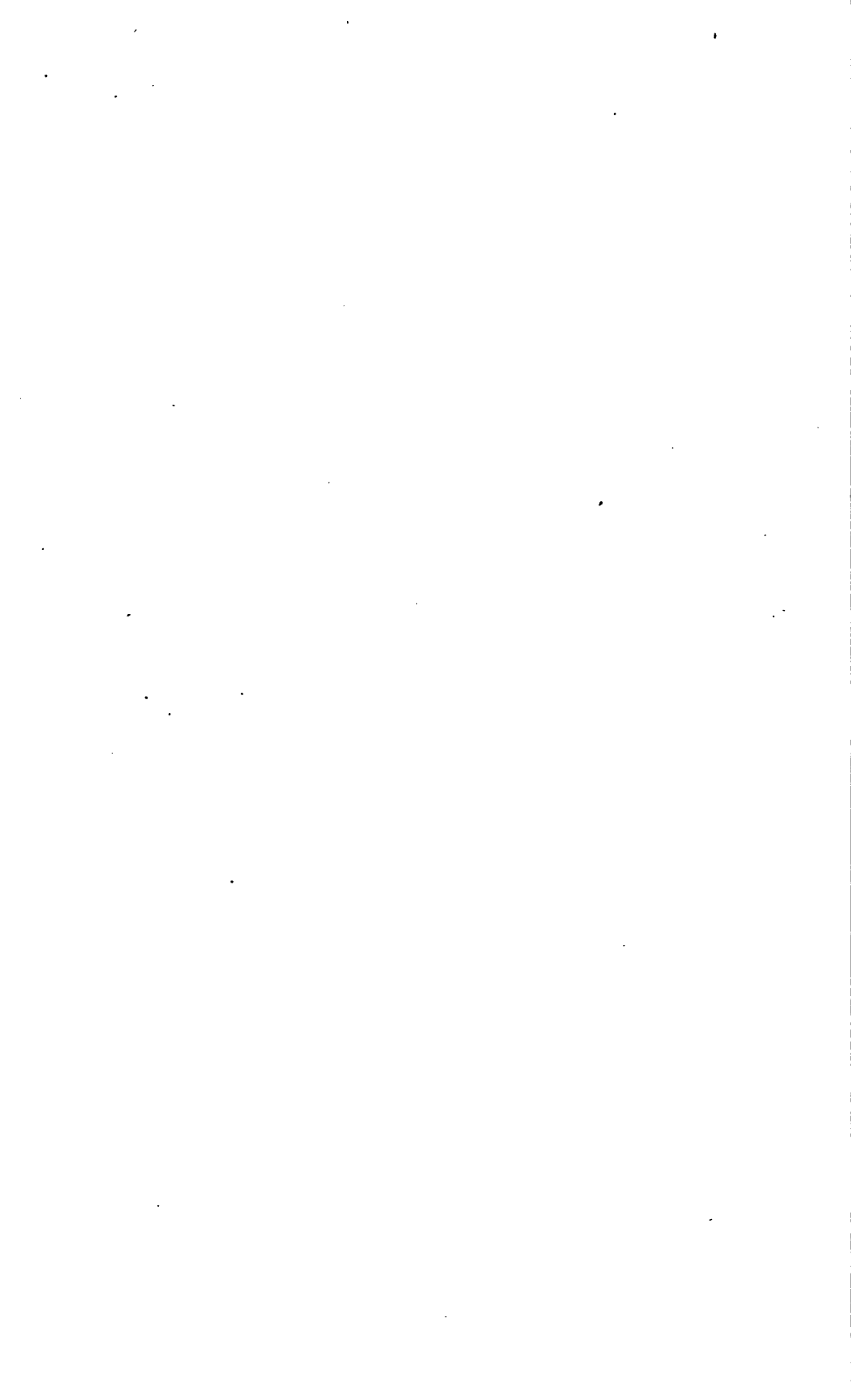
VIEW I.—Avalanche near Fontann, Canton Tessin.

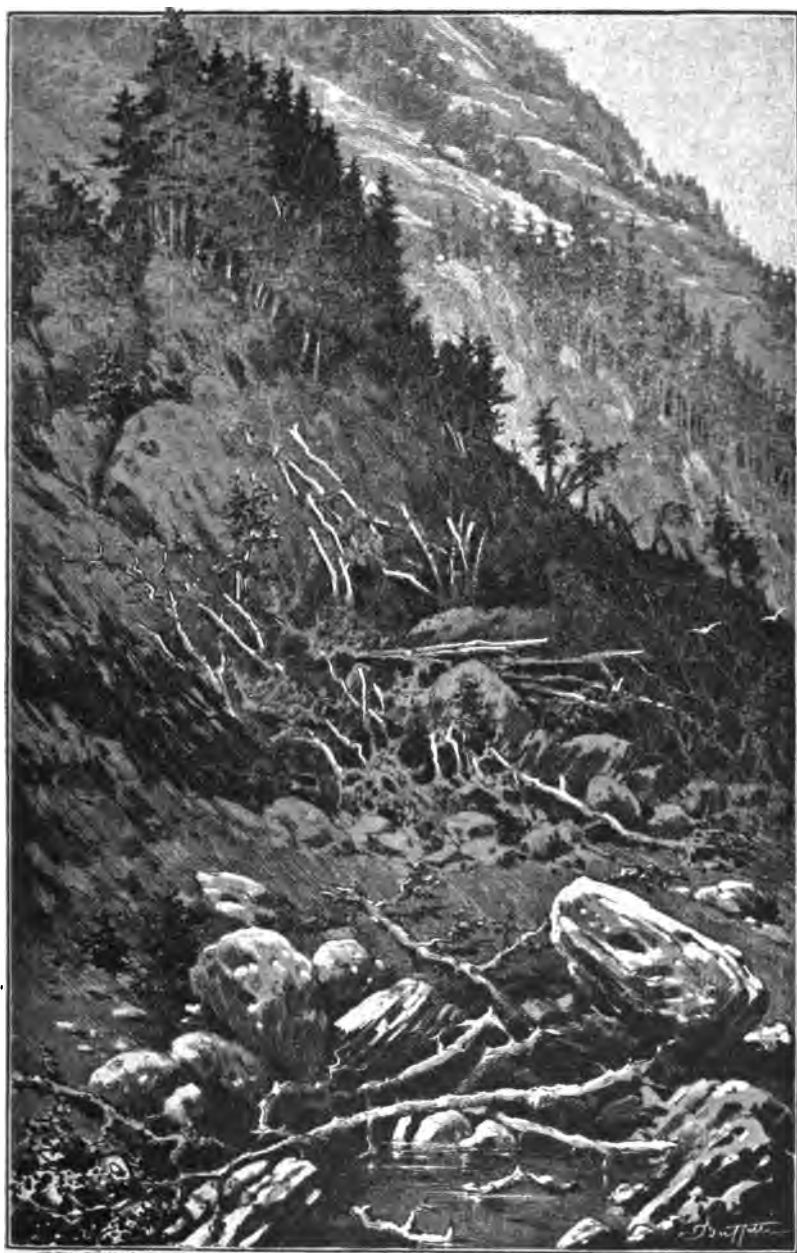
(May 31, 1870)





VIEW II.—Nearer view of the ruins at Fontana.





VIEW III.—Avalanche in Lauterbrunn Valley, May 1, 1879.

(Showing the damage wrought by atmospheric pressure along the course of the avalanche.)

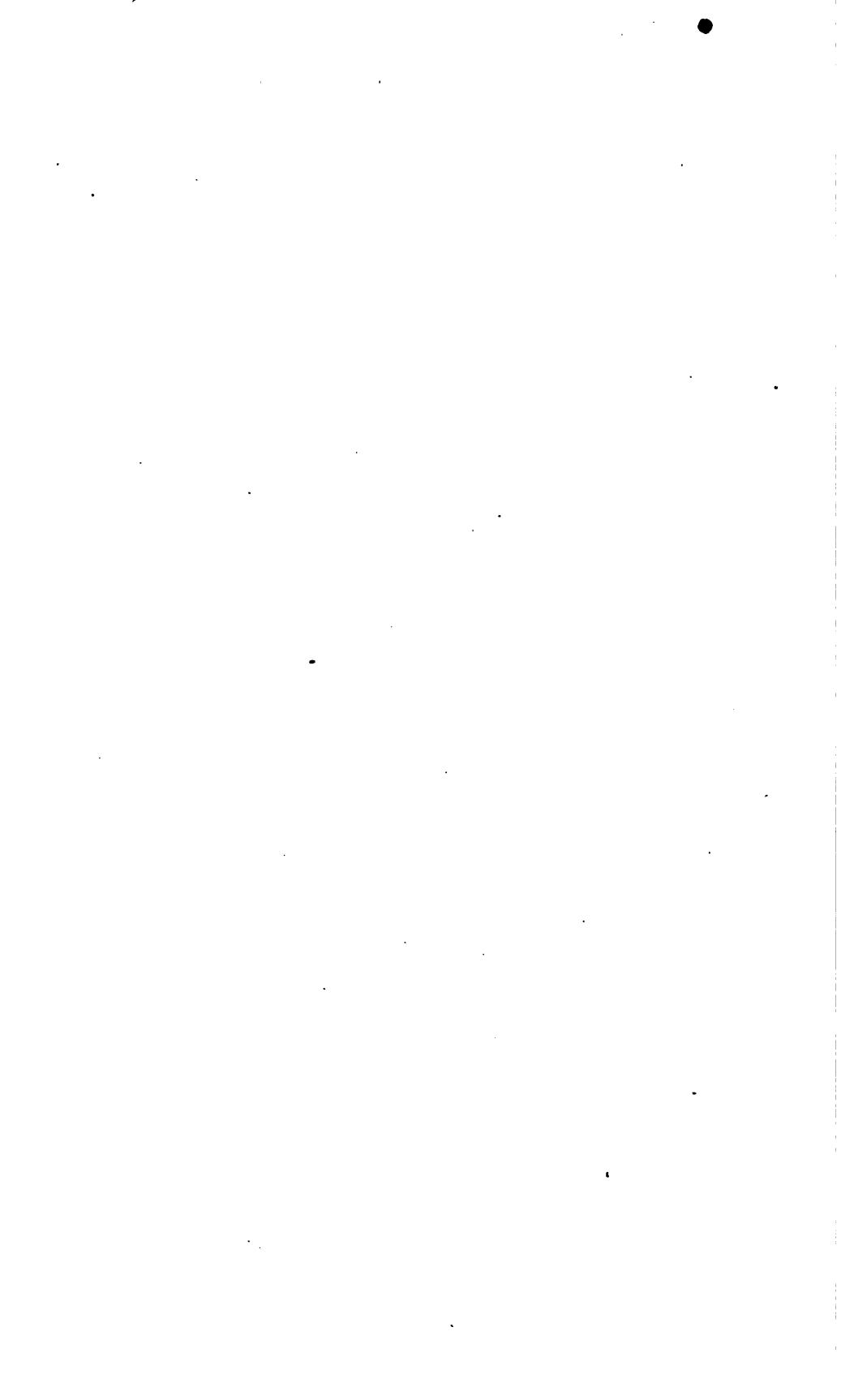




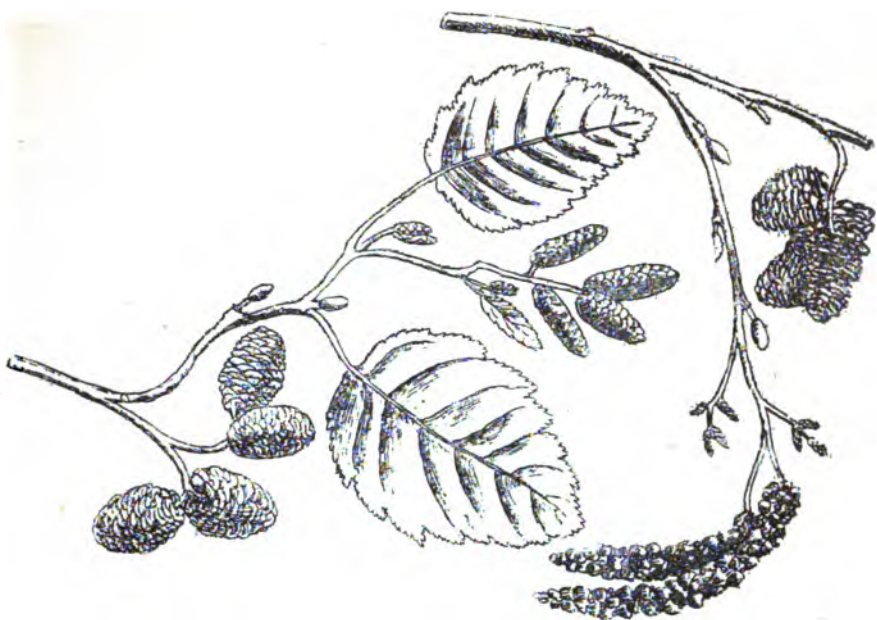
2. *Ailanthus glandulosa*.



3. *Alnus glutinosa*.



4 *Alnus incana*

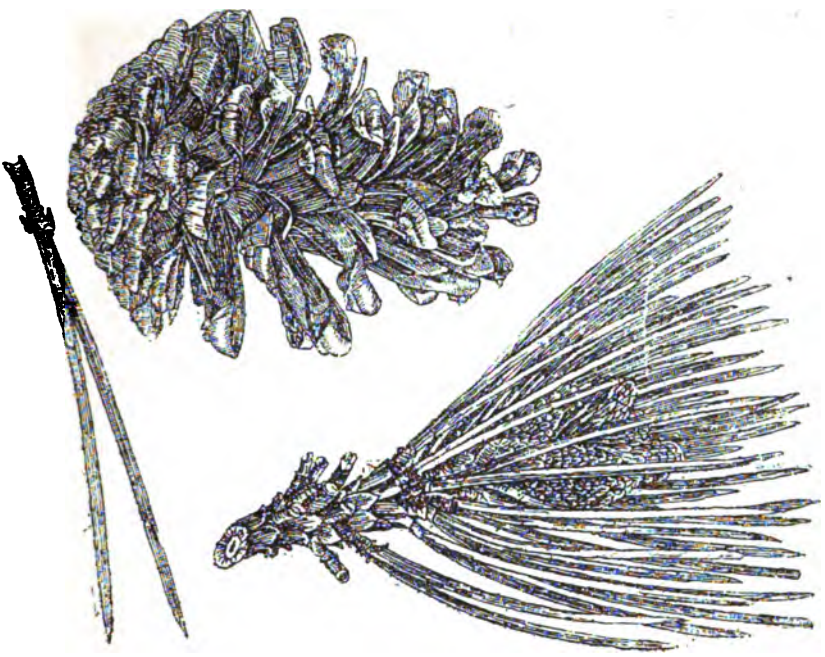


6 *Hippophaea rhamnoides*

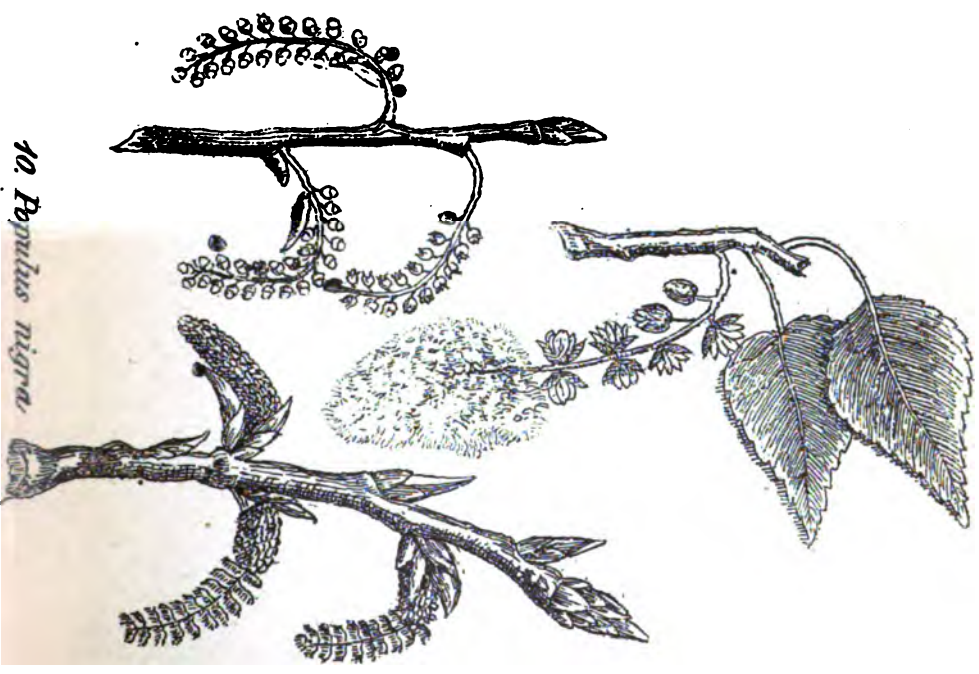


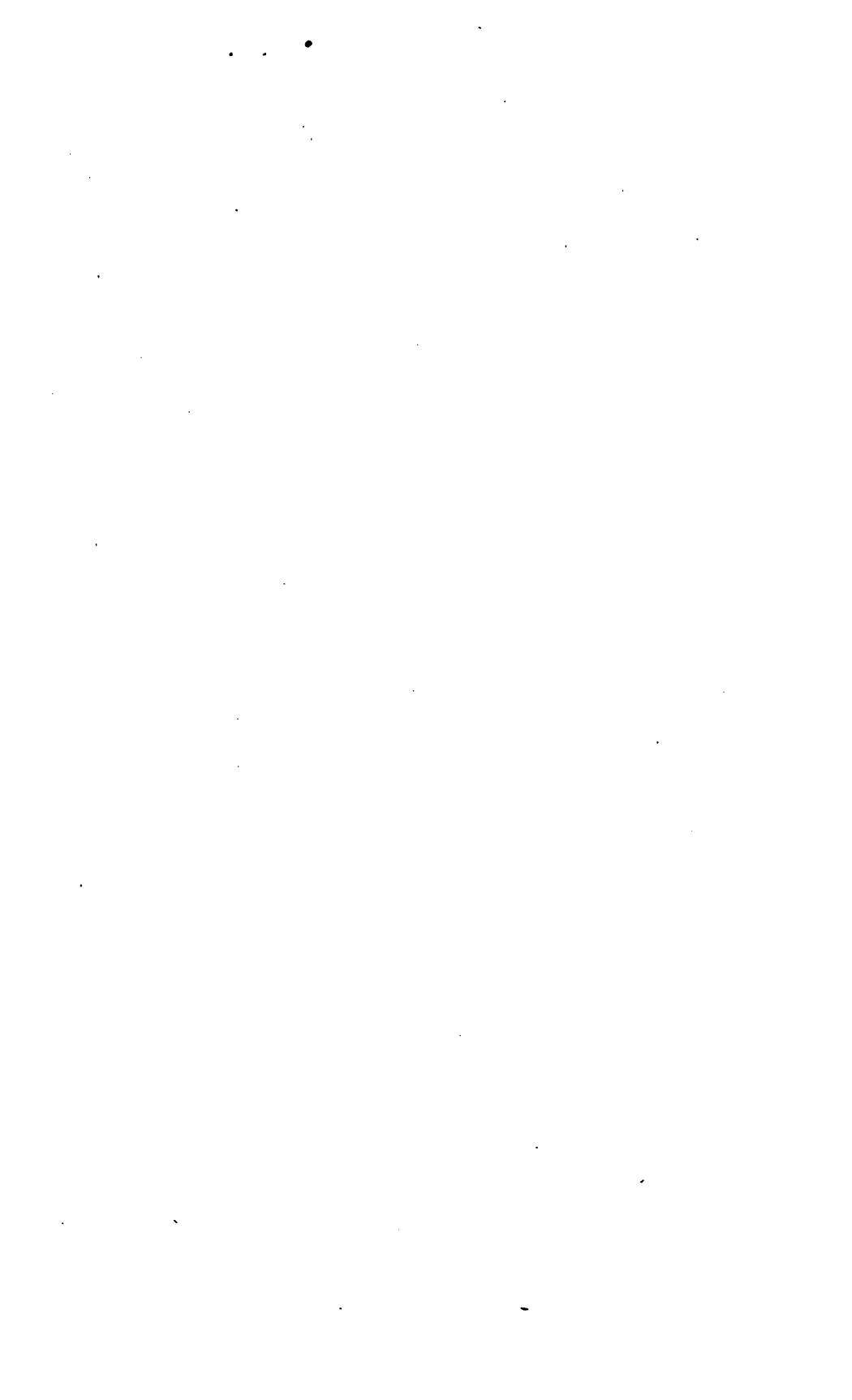


7 *Pinus austriaca*



10. *Populus nigra*





14. *Salix amygdalina fusca*

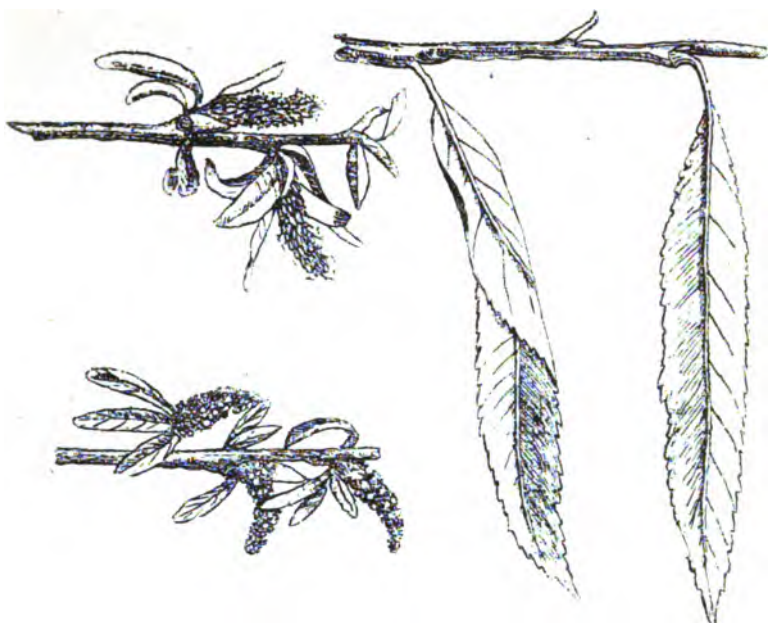


15. *Salix caprea*

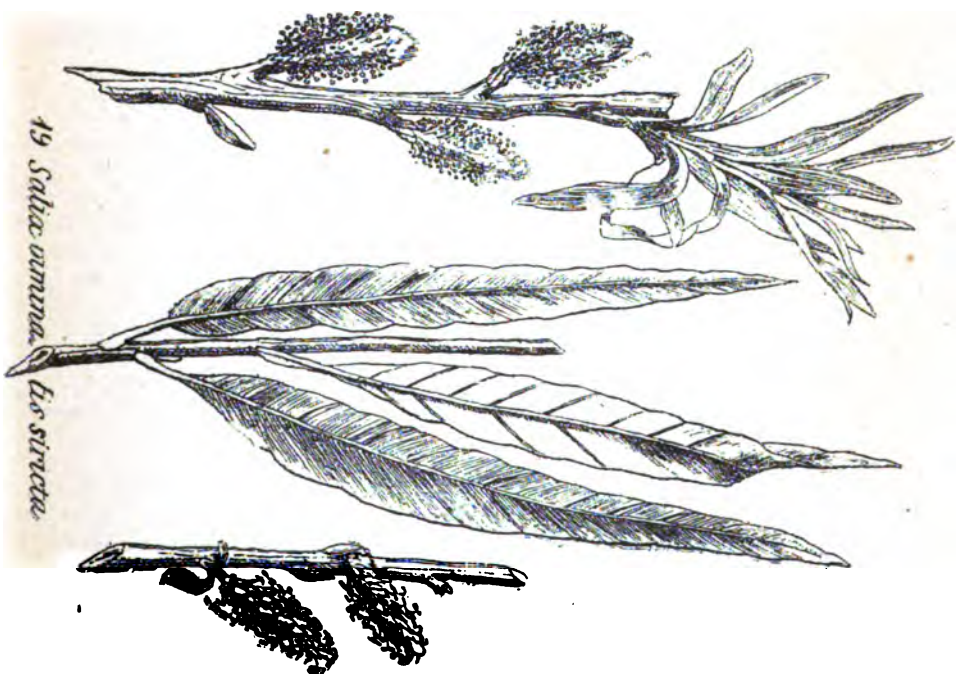




17 *Salix purpurea*



19 *Salix omma*
fo. stricta





40. District forestmasters shall visit the township and corporation forests regularly, and that as often as their duties of forest police superintendence render necessary. On such visits they shall acquaint the overseers or overforesters, who, together with the forester, shall accompany them whenever they visit the forest, with the necessary instructions relative to the locations of the clearings and the performance of the work of thinning out, weeding, and cultivation, and shall collect materials for plans of cultivation, reports upon the same, and methods for regulating the yield.

41. Plans for cultivation shall at the proper time be submitted by the district forestmasters to the overforester for examination, and for procuring the approval of the direction of the interior thereto.

42. The overforester shall make a report yearly to the direction of the interior concerning the management of the township and corporation forests, and to this end the district forestmaster shall furnish him special reports at the proper time.

43. Overseers are responsible for the execution of the rules pertaining to the plans of cultivation and of the orders of forestry officials. They shall collect the necessary materials for the annual reports of the district forestmasters, such as regulation of yield, reports on cultivation, &c.

44. Any unusual consumption of wood exceeding the fixed yield, as well as other deviations from the plan of cultivation or the decrees of the district forestmasters, can only occur with the consent of the direction of the interior. The application and distribution of the yearly forest yield are not subject to the control of the forestry police.

III.—FOREST POLICE REGULATIONS.

A.—*Digging up—Transfer—Distribution.*

45. Cantonal forests within the cantons shall not only remain in their present condition as regards area, but where opportunity offers shall as far as possible be districted with adjacent forests, while, on the other hand, smaller scattered pieces of woodland shall be disposed of. In case of such sale the direction of the interior shall see that the forest so disposed of is replaced by an equivalent purchase of land.

46. Township or corporation forests cannot, without consent of the government council, be either entirely or partially dug up, transferred, distributed, or, more especially, burdened with any contract for the delivery of wood or for kindred uses. In case of a mortgage, as well as of a foreclosure, a forest continues subject to the existing regulations concerning township and corporation forests; when single parts of a forest system pass in such manner into various hands, such parts continue bound to the general plan of cultivation, and mention of this fact shall be made in the bill of transfer and in the bond.

47. When, in consequence of township laws in such cases made and provided, forests are burdened with claims to the wood, the manner and extent of the delivery of the same shall be determined with accuracy.

B.—*Time for felling and removing timber.*

48. The time for felling begins with the commencement of September and ends with the end of March. Exceptions are as follows:

- (a) In mountain forests where, owing to early snow, felling must be done sooner.
- (b) In bark forests, where the oaks cannot be stripped of bark until the sap runs.
- (c) In forests from which the wood is rafted.

Excepting in pressing cases, no wood is to be cut during any period other than that above prescribed. The clearing away of rotten wood, brush, &c., from young undergrowths, clearings, and artificially constructed young forest areas, may be regarded as belonging to the work of cultivation and may be performed at any time.

49. The removal of felled wood must be completed by the end of April, and neither waste wood, twigs, nor bark shall be left lying in the clearing. In case wood remains lying in the forest beyond the lawful time, it is the duty of every forester becoming aware of the fact to

report it to the forestmaster. It is the latter's duty, through the township authorities, to have it removed outside of the clearing, and in case it be coniferous wood to strip it of bark and have the bark burned. The expense in such case shall be borne entirely by the proprietor of the forest and the owner of the timber.

50. Exceptions to article 49 may be allowed as follows:

(a) In forests as enumerated in article 48.

(b) When local circumstances render the removal of the timber impossible.

In such cases the timber shall be removed as soon as it becomes possible, or at all events shall be placed on the road for removal, and the bark stripped from the coniferous wood and either carried away or burned.

C.—Measures against fires.

51. No fire shall be kindled in forests, or in their immediate neighborhood, or in any peat-bed adjacent to one, without a permit from the local police, who shall provide the proper measures for safety.

52. Exceptions may, however, be made to the foregoing paragraph when no wind is blowing, in the following cases, viz.:

1. The wood-chopper's fire in the clearing marked out for him. Choppers shall light their fires in spots where there is no danger, and shall therefore first remove all inflammable objects; they shall also on going away totally extinguish the fire.

2. The fire for burning roots, singeing, moth-burning, &c., preparatory to field or forest cultivation. In such cases it is directed that—

(a) A flame-fire shall not be used in the forest, but that, in rendering the barrens arable, the upper surface be raked over, collected in heaps, and carefully burned.

(b) In burning over opens, fields and farms adjoining forests, an intervening space of at least 10 paces shall be dug up and a requisite number of workmen be kept constantly at hand to extinguish the fire in case it exceeds its bounds.

53. Charcoal burning, and ash burning, shall only be carried on upon spots designated by the forestmaster.

D.—Measures against insects.

54. Foresters are required to be watchful for any signs of nest-building by insects hurtful to wood, and on discovering any such, either within or without their respective districts, to report the same to the owner of the forest, and to the forestmaster, whereupon the latter shall without delay take the necessary measures.

Likewise, township and corporation overseers, as well as private forest owners, are obliged to report promptly to the forestmaster any injuries by insects coming to their notice, and are held in all cases to an unconditional compliance with the measures decreed by the forestry authorities for protection against damages by insects. Forestmasters shall, as far as possible, instruct foresters in regard to indications of the presence of hurtful insects, and the means of destroying the same.

55. Forest owners are required to remove immediately all breakages by wind or snow, and diseased or withered coniferous boughs, and to dig up or at least strip of bark the coniferous stumps.

E.—Regulations concerning the uses of forests.

56. The dressing of timber and the putting together of buildings on clearings is forbidden where there is any aftergrowth, or where a renewal of growth is delayed thereby.

57. The felling, working, or removal of forest products before day, after nightfall, or on Sundays and holidays, is forbidden.

58. The barking of standing trunks or poles in middle or lower forest clearings is forbidden.

59. The chopping of osier twigs can only be performed in such manner as shall be prescribed by the overseers in accordance with article 33, and on fixed days under the superintendence of the overseers and the foresters.

60. The gathering of chips and waste-wood (in the absence of other lawfully founded regulations) shall only be performed under the following limitations, viz.:

(a) Chips and waste-wood only include wood of less than two inches in diameter which has died from natural causes, or which remains lying on the ground after the clearing has been entirely completed.

(b) The gathering of chips and waste-wood is consequently not permitted in clearings or where the forest has been trimmed, or in places damaged by wind, snow, and ice, until the material not coming under the head of chip and waste-wood has first been removed.

(c) The bringing of tools of any kind whatever, the breaking down of standing poles, and the breaking or tearing off of branches of trees is forbidden.

(d) No gathering shall take place save at the days and hours designated by the forest owner.

(e) The gatherer shall collect only as many chips as he desires to carry home. The removal of chips in carts, as well as the sale of wood so gathered, is forbidden.

61. Where forest pasturage still exists it shall be subject to the following conditions, viz.:

(a) Sheep, goats, and horses are to be entirely excluded therefrom.

(b) It can only be allowed under the supervision of a herdsman.

(c) Growths of saplings, clearings, woods under cultivation, and coppices must be protected from the driving in of pasture cattle, so long as danger of damage to the growth is to be apprehended therefrom.

(d) The driving in of cattle after sundown or before sunrise is forbidden.

62. The gathering of grass and litter outside of existing forest roads and paths, or of the barrens, is only permitted by special consent of the forestmaster and under the following limitations, viz.:

(a) The use of a scythe in gathering grass, save on the barrens and highways, is forbidden.

(b) The gathering of leaves, fallen pine needles, and moss is entirely forbidden on sunny sides, steep slopes, and thin ground. It must not be undertaken in high situated, leaf-bearing forests before the fourteenth year of their growth, in coniferous forests before their thirteenth year, nor in the middle and lower forests before the twelfth year; and in all cases it must be discontinued again three years before the time for chopping. Litter shall only be gathered in any forest once in every three years. The use of other utensils than wooden rakes and loose brooms is forbidden.

(c) The cutting of heath and bilberry herbs can only take place by consent of the forestmaster and according to his instructions.

(d) Pruned leaves shall not be taken from standing trees.

(e) Litter, when gathered, shall not be removed from the forest in carts, but must be carried by hand to the highway.

63. Alternate use for agricultural purposes can only be permitted on dry clearings devoid of after-growth, and only there when the ground is very dry and lacking in moisture. It shall not continue for longer than two years without an alternate interval of tree planting, and the digging over must be done immediately in the following year.

64. The extraction of resin is only permissible in forests which are to be cleared within the ensuing three years.

65. The gathering of acorns and beechnuts when they are required for natural sowing, that is, in forests which have been taken in hand for renewal. Such rights are limited to picking up acorns and beechnuts that have fallen off in the natural way.

66. The gathering of forest berries in sown and planted lands under five years old is forbidden.

67. The forestmaster's consent is necessary to the opening of quarries of clay, sand and gravel pits, and peat beds within the forests; and he shall, in important cases, procure an order therefor from the overforester.

68. Annulled.

IV.—CONCERNING FOREST PRIVILEGES.

A.—*General regulations.*

69. The owner of a privilege is required in availing himself thereof to conform to the forest police regulations as contained in the present law. In case such privilege is hereby limited in its character or extent, he must come to an understanding with the owner of the forest in regard thereto.

70. Such privileges shall not embarrass the owner of a forest in the proper cultivation thereof, nor in making such changes in the kind of wood grown therein, or in the management thereof, as the nature of the soil and climate may require. The continuance of privileges prejudicial to culture must be abated up to such time as they can be advantageously disposed of. In such cases the owner of the privilege may raise a claim for damages only where the need of abatement is brought about by a non-continuance of cultivation on the forest owner's part. Where changes become necessary in the kind of wood grown, or in the manner of growing it, and in consequence thereof privileges cannot be exercised in the same manner as formerly indemnification shall be made, so far as circumstances permit, by transfer of an equivalent, and previously existing privilege in some other forest, or in money.

71. The forest owner, as well as the owner of a privilege, is directed to demand the conversion of undefined forest privileges into those that are defined.

72. All burdensome privileges in forests are subject to cancellation by the forest owner.

73. Recovery shall be made either in a money payment equal to twenty times the value of an average net profit calculated on the basis of the last twenty-five years, or by making over such part of the forest itself as is equivalent in value to such privileges, calculated on the basis of a twenty-five years' average. But if it be shown that in single years during such period the yield of profit has, through any unusual causes, increased or diminished, such years shall be dropped from the twenty-five embraced in the calculations and replaced by an equivalent number of years next previous. The forest owner has choice as to the manner of recovery, excepting in cases provided in the "Law Book of Private Rights." But under all circumstances, and of course in the case provided for in this exception, a settlement by transfer of woodland can only take place when the portion remaining in the owner's possession, as well as the portion to be transferred, admits of a separate and regular cultivation. Only in very extreme cases can the government council consent to an exceptional deviation from this rule concerning settlement by transfers of woodland. Where forests are partitioned off in consequence of separation, or cantonal, township, or corporation distributions, the portions of woodland falling to each party concerned remain subject to the provisions of the law applicable to cantonal, township, and corporation forests. Where recovery is made in money, and the privilege disposed of is mortgaged before a notary, procedure in regard to the price of sale must be had in accordance with the provision of the "Law for the Transfer of Private Rights."

74. In any cases not herein provided for the exercise of privileges must conform to the requirements of the ensuing paragraphs, when no modification is agreed upon by contract, usage, or other title of right between the parties interested.

B.—*Concerning individual privileges.*

THE RIGHT TO FELL WOOD.

75. Timber right covers only such wood as the party possessing said right needs within two years, at furthest, from the day of felling for use, conformably to the conditions thereof.

76. The right to branches includes only those of felled trunks; the right to upper wood, on the other hand, includes the entire crowns of the tree, the branches, and trunk from the beginning of the crown. The chopping off of green or withered boughs from standing trees up to a certain height and thickness can, consequently, only take place when it is expressly so stipulated in the title.

77. The right to wood broken off by wind, snow, or exhalations only cover such pieces as are entirely broken off from the trunks, and in no case the portion of the trunk remaining standing with its roots in the earth, or trunks merely bent or displaced, or branches hanging to the trunk. Trees torn up by the roots may be classed as "windfall" when broken in two by the fall. The rights mentioned in this article do not extend to cases where, by reason of storm, snow, or exhalations, whole stretches of forests are laid waste, or where a large number of tree trunks at one point are levelled or depressed.

78. The right to dead, withered standing wood includes only such trees and saplings as have become withered without any outward cause effected by human agency. The forest owner is directed to designate certain days for the pointing out and removal of withered wood.

79. When, in consequence of damage by snow, wind, insects, or other natural causes, wood in great quantities dies or falls off, the owner of a privilege to gather such is entitled to demand no more than he requires for one year's use.

80. By the term "*Lagerholzrecht*" (right to wood for storage) is understood the right to carry away dead wood from large or small trunks which have fallen of themselves.

81. The right to stump-wood is limited to that part of the tree, with roots, still projecting above the earth after the chopping or cutting away of the trunk; but it never includes stumps or roots from which shoots are to be used for replanting the forest. Digging up of the stump must occur in the year following the felling of the tree. In clearings with overgrowth, in young growths, and on steep slopes it must not occur at all. In digging out stumps no injury must be done to the trees in close proximity thereto. The owner of the privilege is required to fill up the stump-holes with earth and to level them off.

82. The extent of chip and waste-wood privileges and the conditions to which the owner thereof must conform are stated in article 60.

PASTURE RIGHTS.

83. A pasture right embraces the right of grazing by cattle, but not the right to use the grass by mowing, cutting, or pulling up. An owner of a pasture right cannot claim the right to use the grass instead of the right to pasturage. Such owner can drive to pasture only his own cattle, belonging to the working of his farm, but no strange cattle, or cattle bought for trading. He may not, moreover, transfer his right to others.

84. The following regulations, outside of those prescribed in article 61, are valid in the exercise of pasture rights, viz.:

(a) The use of forest pasturage begins with the month of May and ends with the end of September.

(b) During protracted rainy weather forest pasturage is not allowed.

(c) When the way leading to a pasture district passes through a district closed to pasturage, such way must be marked out by the forest owner.

(d) The herdsman, as representing the owner of the pasture right, is responsible for cattle straying into those parts of the forest which are to be protected, *i. e.*, in so far as he does not at once pursue them and bring them back to the herd.

RIGHTS TO LEAVES AND LITTER.

85. The right to leaves and litter embraces the privilege of gathering fallen leaves and pine needles and moss for the gatherer's own use. This right can only be exercised from the end of August up to the falling of the new leaves, and under the rules prescribed in article 62, *b* and *c*.

RIGHT TO GATHER NUTS.

86. The provisions of article 65 are valid in regard to the extent and exercise of this right.

PIT RIGHTS.

87. The right to dig out sand, clay, stone, gravel, &c., is coupled with the following regulations, viz.:

(a) The owner of the right shall only dig for what is stated in his title.

(b) He can only exercise such right in old pits so long as they continue to supply the requisite material, only opening new pits by instructions previously received from the forest owner.

(c) He is obliged to keep in order the road leading to the pit, and shall not, of his own accord, open a new one.

(d) He shall, as far as possible, level off the entrance to the pit.

(e) Upon him depend the means of safety against accidents, as well in new as in abandoned pits.

88. The forest owner is directed to forbid, until further decision by the police authorities, the use of any pit where there is reason to apprehend a caving in upon the workmen, a falling in of the railing or path around it, or any similar occurrence.

V.—CONCERNING FOREST OFFENSES.

1. *Jurisdiction and penalties.*

89. Thefts and other offenses coming under the provisions of the criminal law are conditionally subject to the provision of article 91 of "Judicial Sentences." In regard to other trespasses (forest offenses) the following decrees are valid, viz.:

90. Forest offenses on the part of persons in the forestry service, or of township and corporation and other overseers, will be treated as disciplinary offenses, according to the provisions of the "Law Concerning Order and Penalties," in so far as, under the following regulations, no higher than the ordinary judicial penalty is imposed. Penalties upon persons employed in the forestry service shall be imposed by the forestry authorities, those upon townships and corporations by the direction of the interior.

91. Other forest offenses and misdemeanors, among which latter are to be enumerated thefts of wood, twigs, &c., in value not exceeding 2 francs, will be treated as police trespasses, according to the provisions of the "Law Concerning Order and Police Penalties."

92. Violations of the provisions contained in the present law, viewed in the way of indemnifications, entail the following penalties, viz.:

(a) For disregard of the provisions of article 48-55, concerning the period for felling and removing wood, and danger by fire, and damages by insects, from 3 to 35 francs.

(b) For unauthorized pasturing in old forests, 1 to 3 francs per head of cattle; for trespass against limitations specified in article 61, 2 to 6 francs per head; in any case the fine shall not exceed the sum of 40 francs; the party who, either in person or through the agency of his (or her) children, servants, or employés, causes such unauthorized pasturages is to be held therefor.

(c) For violating the provisions of article 62 and articles 64-67, concerning kindred uses (*Nebennutzungen*), 2 to 20 francs.

(d) For driving outside of the forest roads, or damage of any kind to boundary marks, 2 to 10 francs.

(e) For the unauthorized uses of axes, saws, or similar instruments in the forests, 2 to 5 francs.

(f) For offenses for which no special penalty is provided, 2 to 50 francs.

In cases of violations of the foregoing regulations by overseers or foresters the fine will be doubled.

93. In case boards of overseers are guilty of official disregard of the provisions of this law, or neglect in enforcing its directions, each derelict member thereof shall be liable to a fine of from 2 to 50 francs, and shall be held for the damage resulting therefrom to the forest.

94. As well in the case of judicially punishable offenses as in the case of other violations, the following are to be regarded as aggravating features, viz.:

(a) When the offense is committed before sunrise, after sunset, or on Sundays or holidays.

(b) When committed by persons employed at the time in the forest as wood-choppers, charcoal-burners, or generally in the exercise of any forest privilege.

(c) When the offender is armed, disguised, refuses to give his name and residence, or does so incorrectly.

(d) When he does not obey the forester's order, or offers any other resistance, in so far as his conduct does not fall under the provisions of the criminal law.

(e) When saws are used instead of axes, or when means are used to smother the sound of saw or axe.

(f) When the offense is committed with the intention of selling either the natural or wrought products of the forests.

2. Method of procedure for forestry officials and foresters in cases of forest trespass.

95. The overforemaster and the four forestmasters are required to report to the direction of the interior every violation of law committed by boards of overseers for townships and wood corporations, and to specify in detail the damage caused thereby.

96. It is likewise the forester's duty to report to his superiors every violation of the forestry law committed within his district, and every such violation of which, in the discharge of his duty, he may become cognizant, even if outside of his district, as well as every trespass committed, and to prevent as far as possible the continuance thereof. Foresters are also charged with the maintenance of the game laws.

97. The forester shall enter in his day-book detected offenses and trespasses in serial order, and when he discovers the perpetrator, shall record his full name, with the day, hour, and place of the act, and the value of the articles stolen. He shall also note in connection therewith whether, in the commission of the trespass or pursuit of the trespasser, any of the aggravating features specified in article 94 have transpired. At the end of every month the forester shall hand in his day-book to his superior officer, who shall set down the amount of compensation for damages (according to articles 104-106), and take steps to secure conviction. In case of more serious trespass, the forester will report to his superior immediately. If the forester observes that his superiors do not take steps to secure conviction, it is his duty to make a report of the fact to the overforemaster.

98. If the perpetrator be unknown, or if a known offender, after notice has been given him, does not abstain from trespass and leave the forest, the forester is justified and duty bound to detain him, and deliver him over to the town authorities. Local police authorities and policemen are required in such cases to furnish assistance to the forester if he calls for it.

99. The forester is authorized, partly as evidence of the offense and partly for the prevention of flight and from motives of personal safety, to take away from any unknown trespasser caught in the act, any tools or vehicles which he may have with him, or any cattle calculated to do damage; he must, however, at once turn them over to the town authorities, who shall hold them in seizure until sufficient security is deposited to cover damages and fine.

100. If a forester meets upon the road, especially a forest road, a person carrying forbidden forest products, or coming out of the forest with wood at a time forbidden by law, he is justified in detaining such person, asking his name and address, and the way and manner in which he came into possession of the articles. If circumstances prove suspicious, or if he discovers that the articles have been stolen, he shall proceed to the town authorities for an investigation of the facts in the case.

101. Where trespasses are committed in a forest and the forester is not able to detect the perpetrator, while suspicious circumstances indicate a clue to his identity or to the place whither the stolen articles have been taken, the forester shall apply to the town official, or, in his absence, to his representative, and in company with the latter execute the necessary search-warrant.

102. Foresters shall be provided with service badges and be armed so far as it is requisite for the discharge of their duties. Detailed instructions concerning the use of weapons will be furnished by the government council.

3. Concerning value and amount of damages.

103. The value of stolen articles shall be determined on the basis of local prices at the time the trespass is committed. In addition to this value, the trespasser shall make good the amount of damage, according to the provisions of the following articles:

104. The amount of damage shall be calculated as follows, viz.:

1. For thefts of standing timber:

(a) For green wood when the crown fork is not broken, one-half the value.

(b) For green wood when the crown fork is broken; further, for seed trees, upper-wood branches in middle forests, and split poles in lower forests, the entire value.

(c) For the cutting of twigs or osiers, in violation of article 33, double the value. In other cases, the simple value.

(d) For cases where other trees, after-growth, or stump-sproutings are damaged by the felling and removal of stolen wood, the simple value.

For damage to older trees, the amount specified in section 2, in addition to cost of making the damage good; and

For damage to stump-sproutings under eight years old, four times the value.

(e) For stumps liable to sprout, four times the value.

Otherwise for thefts of stump-wood, the provisions of letter (d) above are applicable.

2. For damage to standing timber:

(a) When resulting in the death of the tree, the amount stated in section 1, letters (a) and (b) of this article.

(b) When not involving the death of the tree, from a half down to a tenth of the value of the tree or pole damaged, according to the extent to which their usefulness has been impaired or their growth disturbed.

105. In cases of theft of plants, the amount of damages shall be as follows, viz.:

(a) For plants taken from young growths under ten (10) years old and where no subsequent repair is necessary, the simple value.

Where such is necessary, three times the value.

(b) For plants taken from seed schools and nurseries, in all cases, three times the value.

106. The following damages are to be reckoned for the unauthorized use of forest privileges, viz.:

(a) For pasturage and the use of grass, the value of the damage inflicted, which, however, shall equal at least one-half of the penalty. The owner or proprietor of the cattle is to be held responsible for the payment of value and damages.

(b) For gathering litter in localities prohibited in article 62, letter (b), or for use of unauthorized tools, the simple value of the litter outside of the locality under prohibition.

(c) For taking resin, according to the value of the tree tapped, and from the full amount of such value down to a tenth of the same, according as the tree has been impaired in usefulness or disturbed in growth or brought entirely down, and, in the latter case, by being removed, has been broken off at the crown fork.

(d) For gathering nuts, wood-seed, wild fruit, wood-berries, &c., five times the value of the articles stolen.

(e) If stone, sand, gravel, peat, &c., are stolen, the damages to the forest is to be estimated according to article 104, fig. 2, letter (a), and to this must be added the cost of restoring the former conditions.

107. Concerning detention for payment of values and damages, the provisions of article 1872-74 of the Law of Private Rights are applicable, with reserve as to the case designated in article 106, letter (a).

108. The amount of value and damages shall, as a rule, be determined by the authorities imposing the penalties. Where such authorities are not judicial ones, each party has the right, within eight days, to protest against the decision, and in such case it remains for the claimant to make good his claim by the usual legal procedure.

109. This law takes effect January 1, 1860, in regard to the salaries fixed in articles 7 and 8; and January 1, 1861, in regard to its remaining provisions. The forestry law of September 29, 1837, and the supplementary law of June 24, 1840, are hereby repealed. The government council is charged with the execution hereof.

Forest trees of Switzerland.

I.—LEAF-BEARING GENUS.

Species.	Where found.
1. Alpine bean tree.....	Jura and Southern Switzerland.
2. Alpine alder.....	Everywhere up to 2,000 meters altitude.
3. Ordinary apple*.....	Everywhere.
4. Aspen.....	Everywhere up to 1,300 meters altitude.
5. Bastard wild ash.....	Rare.
6. Mountain maple.....	Everywhere up to 1,600 meters altitude.
7. Ordinary pear*.....	Everywhere.
8. Ordinary birch.....	In Central and Northern Switzerland up to 1,300 meters altitude, and in Western Switzerland up to 1,750 meters.
9. Bean tree.....	Everywhere, both wild and as an ornamental shrub.
10. Marsh willow.....	Everywhere.
11. Beech.....	Everywhere up to 1,000–3,000 meters altitude.
12. Boxwood.....	Jura.
13. Crr. oak.....	Canton Tessin.
14. Wild ash (S. or B. apple).....	Everywhere up to 1,800 meters altitude.
15. Cultivated.....do.....	Quite rare.
16. Lotus tree.....	General; highest altitude, 650 meters.
17. Ash.....	Everywhere in Central Switzerland up to 1,150 meters altitude; in the Bernese Alps up to 1,300 meters.
18. Black alder.....	Everywhere up to 1,000 meters altitude.
19. Field maple.....	Not often met with; highest altitude, 700 meters.
20. Wild cherry.....	Quite common.
21. Slippery elm.....	In the Alps up to 800 meters altitude.
22. Gray willow.....	Everywhere.
23. Grove beech.....	Everywhere in the Jura up to 800 meters, and in the Alps up to 900–1,100 meters altitude.
24. Dogwood.....	Everywhere.
25. Hazel.....	Everywhere up to 1,200–1,300 meters altitude.
26. Black elder.....	Everywhere up to 1,100 meters altitude.
27. Hop beech.....	In Italian Switzerland.
28. Caspian willow*.....	Imported from Russia.
29. Chestnut.....	In the milder sections of Switzerland, <i>i. e.</i> , Canton Tessin, up to 900 meters altitude.
30. Basket-willow.....	Everywhere.
31. Buch-thistle.....	Quite common; highest altitude, 1,000 meters.
32. Liguster.....	Everywhere.
33. Laurel.....	In Tessin.
34. Bay willow.....	Everywhere.
35. Almond willow.....	Do.
36. Mulberry*.....	In Tessin; imported from Asia Minor, Persia, and China.
37. Meal-tree.....	Everywhere.
38. Medlar*.....	Quite rare.
39. Weeping willow.....	Everywhere.
40. Plane tree (occidentalis)*.....	In deep valleys; imported from North America.
41. Purple-willow.....	Everywhere.
42. Poplar (pyramid or Italian)*.....	Everywhere; imported from Persia.
43. Quince*.....	Imported from the Orient.
44. Common acacia*.....	Everywhere; imported from North America.
45. Horse chestnut.....	Everywhere; originates in East India.
46. Hair-birch.....	
47. Sallow willow.....	Everywhere.
48. Sand thistle.....	Do.
49. Bitter thistle.....	Everywhere; highest altitude, 1,600 meters.
50. Twining-shrub.....	Everywhere; highest altitude, 1,400 meters.
51. Snowball.....	Everywhere; highest altitude, 1,100 meters.
52. Black thistle.....	Everywhere.
53. Black alder.....	Everywhere; highest altitude in Alps, 1,100–1,300 meters.
54. Black poplar.....	Everywhere.

* Of foreign origin.

Forest trees of Switzerland.—Continued.

I.—LEAF-BEARING GENUS—Continued.

Species.	Where found.
55. Silver poplar.....	Everywhere.
56. Silver willow*.....	Everywhere; imported from Siberia, Caucasus, and the Orient.
57. Summer linden.....	Everywhere.
58. Spindle tree.....	Everywhere; highest altitude, 900 meters.
59. Pointed maple.....	Everywhere; highest altitude, 1,300 meters.
60. Holly tree.....	Everywhere; highest altitude, 1,400 meters.
61. Summer oak.....	Everywhere; highest altitude in Jura, 700 meters, and in the Central Alps, 800–1,000 meters.
62. Winter oak.....	Everywhere; highest altitude, 1,000–1,300 meters.
63. Red-berry alder.....	Everywhere; highest altitude, 1,000 meters.
64. Red cherry.....	Quite general.
65. Ordinary elm.....	Everywhere; highest altitude, 1,100–1,300 meters.
66. Bird cherry*.....	Everywhere; highest altitude, 1,000 meters.
67. Ordinary walnut.....	Everywhere; highest altitude, 800–1,150 meters; originates in Asia.
68. Gray walnut*.....	Originates in North America.
69. Black walnut.....	Originates in North America; found in levels and hilly places.
70. White thistle.....	Everywhere; highest altitude, 900 meters.
71. White alder.....	Everywhere; highest altitude, 1,400 meters.
72. Winter linden.....	Everywhere; highest altitude, 1,200 meters.
73. Zuerger (?).....	In Southern Switzerland.
74. Dwarf birch.....	Rare; found in the Alps.

II.—CONIFEROUS GENUS.

1. Siberian pine.....	Found in the Alps, especially in the Upper Engadine and Bernese Oberland; highest altitude, 2,300 meters.
2. Mountain fir.....	In the Alps and fore-Alps; highest altitude, 1,000–2,000 meters; (a) forked fir, Southwestern Switzerland; (b) mugho fir, Southern Alps; (c) low fir, Alps.
3. Yew.....	Everywhere; but always among other species of wood.
4. Pine, red fir.....	Everywhere; highest altitude in West Switzerland, 1,650 meters; Central Switzerland, 1,700 meters; East Switzerland, 1,850 meters; Southern Switzerland, 2,000 meters.
5. Ordinary fir.....	Everywhere; highest altitude in Northern Switzerland, 1,750 meters; Central Alps, 1,900 meters.
6. Larch.....	Everywhere; highest altitude in Northern Switzerland and Bernese Alps, 1,950–2,250 meters.
7. Savin.....	Rare.
8. Black fir*.....	
9. White pine.....	Everywhere; highest altitude in North Switzerland, 1,300 meters; Central Switzerland, 1,450 meters; Bernese Alps, 1,600 meters.
10. Ordinary juniper.....	Everywhere; highest altitude, 1,200 meters.
11. Weymouth's fir*.....	Highest altitude, 1,200 meters.
12. Dwarf juniper.....	In the Alps up to the limit of tree-growth.

* Of foreign origin.

RATES OF FOREST GROWTH.

In various parts of Switzerland experiments have been carefully instituted to determine the rates of growth of different species of trees at various altitudes and exposures. The results of these have proved both interesting and valuable. The following table includes such as pertain to the canton Zurich:

Species.	Altitude above sea-level, meters.	Exposure.	Age, years.	Height, meters.	Diameter, meters.	Form number, meters.	Bulk, cubic meters.	Average growth.		
								Height, meters.	Thickness, meters.	Bulk, cubic meters.
Fir.....	515	NW.	124	35	0.460	0.493	2.703	0.28	0.0048	0.0218
White pine.....	525	NE.	80	35	0.457	0.596	3.420	0.44	0.0092	0.0427
Lichen.....	525	NE.	74	32	0.392	0.520	2.010	0.45	0.0085	0.0251
Larch.....	530	Level.	110	33	0.390	0.493	1.944	0.30	0.0037	0.0177
Beech.....	620	NE.	112	29	0.423	0.552	2.240	0.28	0.0038	0.0201
Mountain maple.....	560	NE.	73	28	0.322	0.453	1.033	0.39	0.0044	0.0141
Elm.....	560	NE.	75	29	0.287	0.504	0.945	0.39	0.0038	0.0113

Rates of periodical growth of seven different species, by decades (Zurich).

[illegible]

Rates of periodical growth of seven different species, by decades (Zurich).—Continued.

Age in years.	Beech.				Mountain maple.				Elm.			
	Height in meters.	Thickness in centimeters.	Bulk in cubic meters.	Per cent.	Height in meters.	Thickness in centimeters.	Bulk in cubic meters.	Per cent.	Height in meters.	Thickness in centimeters.	Bulk in cubic meters.	Per cent.
1 to 10.....	0.5	3.0	0.003	.....	1.0	2.0	0.001	.....	1.0	0.2	0.001	.....
11 to 20.....	2.0	4.9	0.017	14.00	4.0	5.2	0.009	20.00	7.0	3.2	0.003	13.00
21 to 30.....	4.5	3.9	0.059	11.78	6.0	8.1	0.086	18.54	4.0	5.2	0.032	17.00
31 to 40.....	4.0	4.4	0.109	8.12	6.0	5.0	0.127	8.55	4.0	5.6	0.089	11.28
41 to 50.....	4.5	4.6	0.189	6.66	5.0	5.2	0.216	6.75	6.0	6.0	0.209	9.16
51 to 60.....	3.5	5.2	0.282	5.43	1.5	3.8	0.223	4.14	4.0	4.0	0.251	5.45
61 to 70.....	3.0	3.4	0.249	3.18	3.0	2.7	0.192	2.57	2.5	2.6	0.188	2.77
71 to 80.....	2.0	4.2	0.339	3.14	2.5	1.5	0.190	2.23	1.0	1.7	0.173	2.02
81 to 90.....	2.0	4.0	0.315	2.24	.....	.....	.....	.....	.....	.....	.....	.....
91 to 100.....	2.0	2.6	0.335	1.94	.....	.....	.....	.....	.....	.....	.....	.....
101 to 110.....	1.0	2.0	0.351	1.69	.....	.....	.....	.....	.....	.....	.....	.....
111 to 120.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
121 to 130.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

RATES OF GROWTH AT HIGH ALTITUDES.

A comparison of the foregoing results with those obtained from similar experiments in the Upper Engadine, as shown in the succeeding tables, show how great an advantage forest owners in the lower hills, say 500 meters above the sea-level, possess over those in the mountains 1,500 to 2,000 meters above the sea, as, for instance, in the case of lichens and larches, which, during their first hundred years of growth, gain six times as much in bulk in the former localities as they do in the latter.

Species.	Altitude above sea-level.	Exposure.	Age.	Height.	Diameter.	Form number.	Bulk.	Average growth.
	Meters.		Years.	Meters.	Meters.		C. M.	C. M.
Low fir.....	1,860	S.	110	6.0	0.1510	0.524	0.0563	0.00051
Mountain fir.....	1,590	Plateau	110	16.2	0.3487	0.422	0.6573	0.00600
Siberian pine.....	1,880	N.	230	17.0	0.3845	0.503	0.9938	0.00430
Larch.....	1,850	N.	170	21.0	0.3762	0.502	1.1718	0.00600
Lichen.....	1,865	NE.	140	22.5	0.3477	0.542	1.1591	0.00830

Rates of periodical growth of five different species at high altitudes, by decades (Upper Engadine).

Age in years.	Low fir.		Mountain fir.		Siberian pine.		Larch.		Lichen.	
	Bulk in cubic meters.	Per cent.	Bulk in cubic meters.	Per cent.	Bulk in cubic meters.	Per cent.	Bulk in cubic meters.	Per cent.	Bulk in cubic meters.	Per cent.
21 to 30.....			0.0389				0.0012		0.0010	
31 to 40.....	0.0003		0.0766	5.70			0.0011	6.11	0.0060	14.63
41 to 50.....	0.0036	13.85	0.0927	5.49	0.0040		0.0015	4.83	0.0167	10.85
51 to 60.....	0.0055	7.75	0.0875	3.38	0.0062	8.63	0.0044	7.21	0.0278	7.38
61 to 70.....	0.0075	5.51	0.0800	2.33	0.0199	9.85	0.0158	9.76	0.0515	6.66
71 to 80.....	0.0102	4.53	0.0866	2.03	0.0245	5.78	0.0460	9.83	0.0635	4.71
81 to 90.....	0.0092	2.86	0.0753	1.48	0.0419	5.54	0.0880	7.67	0.0934	4.45
91 to 100.....	0.0105	2.50	0.0581	1.04	0.0423	3.51	0.0941	4.57	0.1399	4.22
101 to 110.....	0.0090	1.73	0.0545	0.87	0.0481	2.95	0.0973	3.23	0.1891	3.81
111 to 120.....					0.0505	2.38	0.1130	2.78	0.1900	2.77
121 to 130.....					0.0506	1.90	0.1412	2.65	0.1763	2.03
131 to 140.....					0.0661	1.68	0.1534	2.25	0.2018	1.91
141 to 150.....					0.0661	1.41	0.1271	1.55		
151 to 160.....					0.0537	1.13	0.1278	1.35		
161 to 170.....					0.0469	1.11	0.1592	1.46		
171 to 180.....					0.0763	1.41				
181 to 190.....					0.0835	1.34				
191 to 200.....					0.1054	1.47				
201 to 210.....					0.0774	0.97				
211 to 220.....					0.0791	0.89				
221 to 230.....					0.0690	0.72				

FOREST AREAS AND YIELD.

Latest statistics place the total area of woodland in all Switzerland at 785,374 hectares, or 1,940,659 square acres, which is about 19 per cent. of the entire area of the country. Of this, two-thirds consists in townships and corporations forests, and seven-eighths of the remainder is private property, and one-eighth the property of the cantons. The average annual yield is estimated at about four dollars (\$4.16) to the square acre from all sources; the total yield being approximately estimated as follows:

Description.	Cubic meters.	Francs.
Firewood.....	1,673,400	15,478,950
Lumber.....	1,115,600	17,849,600
Pasturage, bark, leaves, berries, &c. (estimated).....		6,671,450
Total yield.....		40,000,000

The percentage of yield appears, however, to be considerably higher in the government forests than it is in the others, indicating their superior cultivation. For instance, the yield of wood per hectare (2.4 square acres) in private

forests averages only 3.37 cubic meters, and in the township and corporation forests 3.57 cubic meters, while the government forests yield an average of 4.75 cubic meters per hectare, annually, of the total yield of wood in all Switzerland.

	Cubic meters.
Private forests furnish.....	774,000
Township and corporation forests furnish.....	1,859,000
Government (in canton) forests furnish.....	156,000
Total.....	2,789,000

As showing at a glance the present state of Swiss forestry, I subjoin the following:

Table showing amount and distribution of forest areas by cantons, and their annual yield in kind and value.

Cantons.	Total forest area, in hectares.	Percentage of total area of the canton.	Percentage of forests, area belonging to cantons.	Percentage of forests, area belonging to townships and corporations.	Percentage of forests, area belonging to private owners.	Annual yield per hectare, in cubic meters, wood.	Percentage of yield in lumber.	Percentage of yield in firewood.	Total value of wood yield per annum, in francs.	Annual yield per hectare, in francs.
Aargau	43,238	30.80	7.09	78.07	14.84	6.30	30	70	3,236,559	74.65
Appenzell, A. R.	4,838	19.98	1.38	24.20	74.42	3.55	60	40	251,185	52.58
Appenzell, I. R.	3,001	16.91	1.32	42.26	56.42	3.91	40	60	155,047	51.67
Baselland	14,604	34.64	0.10	74.00	25.90	3.74	30	70	846,811	58.00
Baselstadt	390	10.89	.....	42.56	57.44	4.00	20	80	26,520	68.00
Berne	143,780	20.87	7.68	53.84	38.48	3.65	25	75	5,006,975	34.65
Freiburg	27,751	16.63	7.63	47.22	45.15	3.52	60	40	1,328,244	47.87
Geneva	2,145	7.68	.....	11.89	88.11	4.00	25	75	203,000	70.00
Glarus	12,384	17.92	.....	98.00	2.00	3.00	60	40	453,254	36.60
Graubunden	96,995	13.59	0.21	90.82	.97	2.25	33	67	2,322,052	23.94
Lucerne	30,060	20.03	0.89	16.83	82.28	4.39	45	55	1,806,583	59.72
Neuenberg	22,549	27.91	7.86	46.42	45.72	4.16	60	40	845,179	50.71
Nidwalden	6,925	23.84	1.80	76.54	21.66	3.46	50	50	359,850	51.96
Obwalden	12,125	25.68	0.12	92.46	7.42	3.18	40	60	392,670	31.84
St. Gallen	36,310	17.98	2.11	61.04	36.85	3.53	60	40	1,609,790	45.90
Schaffhausen	11,230	38.17	16.70	70.07	13.23	4.45	20	80	719,813	64.10
Schwyz	16,000	17.61	.....	84.38	15.62	2.92	50	50	649,090	37.91
Solothurn	28,856	36.42	2.97	74.40	22.63	3.79	50	50	1,906,712	66.28
Tessin	55,725	19.77	.....	88.50	11.50	2.24	20	80	548,746	9.85
Thurgau	18,096	18.32	6.43	29.57	64.00	4.52	35	65	1,216,560	66.97
Uri	10,855	10.09	.....	88.95	11.05	1.73	34	66	134,230	12.75
Vaud	73,020	22.66	10.47	59.19	30.34	3.75	62	38	3,384,902	46.36
Wallis	63,000	12.00	.....	87.30	12.70	3.18	60	40	1,400,700	22.24
Zurich	48,177	22.29	5.08	51.18	43.74	4.70	33	67	4,169,358	84.60
Zug	3,250	13.59	.....	83.08	16.92	4.94	60	40	204,928	63.21
Total	785,374	18.99	4.20	66.23	29.57	3.57	40	60	33,176,758	42.43

THE YIELD IN CANTON ZURICH.

In this canton, however, owing to its perfected system of forestry, the average annual yield per hectare of woodland (excepting in the private forests) is much higher than that given above for all Switzerland, as for instance:

Average annual yield per hectare in—	All Switzerland.	Canton Zurich.
	<i>Cubic meters.</i>	<i>Cubic meters.</i>
Cantonal forests	4.75	6.4
Township and corporation forests.....	3.57	5.7
Private forests.....	3.37	3.9

The low average of yield in the Zurich private forests is ascribable to a lack of proper care, and also to the great extremes existing in the ages of the trees therein, many of them being very old and many others very young. The total wood yield of the forests, &c., of canton Zurich is estimated as follows, viz.:

	<i>Cubic meters.</i>
From the cantonal forests	12,191
From the township and corporation forests.....	109,507
From the private forests	109,777
From orchards, vineyards, &c	21,045
Total.....	252,520

RAPID INCREASE OF YIELD.

As showing the nearly threefold increase of profit yielded, in francs, per hectare, by the Zurich cantonal forests during a period of fifty years of cultivation, I quote the following table:

Decade.	Gross yield per hectare.	Outlay per hectare.	Net yield per hectare.	Capital value.
	<i>Francs.</i>	<i>Francs.</i>	<i>Francs.</i>	<i>Francs.</i>
1830 to 1840.....	42.20	10.92	31.28	782.00
1840 to 1850.....	45.35	13.18	32.17	804.00
1850 to 1860.....	59.60	13.24	46.36	1,159.00
1860 to 1870.....	91.77	16.72	75.05	1,876.00
1870 to 1878.....	114.90	24.32	90.58	2,264.00

COST OF WORKING AND MAINTENANCE.

According to the reports for 1885 of the management of the forestry system belonging to the city of Zurich proper (which comes under the class known as township forests), the receipts fell short of the estimates by 4,233.20 francs on a total estimate of 85,300 francs.

The following statement is of interest as showing in connection with receipts and expenditures whence such deficiency arises:

Items.	Excess.	Deficiency.
<i>Receipts.</i>		
From forest yield	<i>Francs.</i>	<i>Francs.</i>
From kindred uses.....	2,101. 70	4,801. 25
From wood depot, Zurich	1,897. 50	
From miscellaneous sources.....		74. 55
Total.....	3,999. 20	4,875. 80
<i>Outlays.</i>		
For management.....		60. 42
For taxes and insurance	274. 95	
For costs of profits.....	2,047. 93	
For costs of cultivation		1,121. 35
For costs of construction	1,752. 87	
For furnishing and stock.....	593. 22	
For various causes		130. 60
Total.....	4,668. 97	1,312. 37
		<i>Francs.</i>
Total deficiency in receipts.....		876. 60
Total excess in outlays.....		3,356. 60
Aggregate deficiency.....		4,233. 20

This deficiency, however, does not necessarily prove that the forests are not run at a profit. They simply show that in any given year unforeseen circumstances may prove the estimates formerly made to have been made a trifle too low or too high. That the forests of the city (or township) of Zurich are indeed run at a handsome profit is shown by the following statement of accounts or balance-sheet taken from last year's report. It should be observed that the account is divided into two heads, one covering the wrought and the other the natural products of the forest. The statement covers an area of 2,760 square acres of woodland.

From or for.	Receipts.	Outlays.	Net profit.
<i>Wrought products.</i>			
	<i>Francs.</i>	<i>Francs.</i>	<i>Francs.</i>
Pounds of wrought materials.....	143,100. 18		
Value of stock brought forward.....	94,746. 00		
Profits of impregnating establishment, Adlisberg.....	5,255. 75		
Profits of wood depot, Zurich.....	4,397. 50		
Machine earnings.....	3,041. 70		
Costs of management.....		5,800. 00	
Costs of transportation and working.....		45,329. 46	
Costs of construction		1,713. 57	
Costs of taking inventory.....		2,593. 22	
Costs of obtaining raw materials		173,377. 45	
Total	250,541. 13	228,813. 70	21,727. 43

From or for.	Receipts.	Outlays.	Net profit.
<i>Forest products.</i>	<i>Francs.</i>	<i>Francs.</i>	<i>Francs.</i>
Value of materials disposed of	124,030.02		
Value of kindred uses (pasturage, &c)	5,229.70		
Costs of management		15,739.58	
Taxes and insurance		7,174.95	
Wood-chopping and transportation		28,718.47	
Costs of cultivation		2,178.65	
Costs of construction (roads, &c.)		16,039.30	
Miscellaneous		69.40	
Total	129,259.72	69,920.35	59,339.37
Total for 1885			81,066.80
Total for 1884			82,751.59
Total for 1883			87,262.40

SOURCES OF WOOD AND LUMBER SUPPLY.

Professor Landolt, who has already been quoted, estimates that in the 607,725 households, forming, according to the last census, the population of Switzerland, there are annually consumed 3,646,350 cubic meters of wood, or 6 cubic meters per household. Now, the total product of wood of all kinds useful for firewood, including vine-cuttings, orchard branches, and every other available material, do not possibly exceed 3,000,000 cubic meters, leaving a deficiency of 646,350, which can only be supplied by import. This deficiency does not include, moreover, all the firewood consumed in factories, shops and public buildings, of which no reliable estimate can, however, be made here. In regard to lumber the tables are reversed, the exports largely exceeding the imports, and consisting largely in enormous shipments of rough pine planks to France.

Exports.

Kind.	Germany.	Austria.	France.	Italy.	Elsewhere.	Total.
	<i>Francs.</i>	<i>Francs.</i>	<i>Francs.</i>	<i>Francs.</i>	<i>Francs.</i>	<i>Francs.</i>
Raw lumber	728,881	7,087	4,706,554	515,092	10,272	5,967,886
Firewood	31,345	539	124,943	369,908		526,735
Ebony wood	5,830	67	2,306	698	2,180	11,081
Other woods	76,031	10,513	34,466	280,086	199,228	600,324
Total	842,087	18,206	4,868,269	1,165,784	201,680	7,106,026

Imports.

Kind.	Germany.	Austria.	France.	Italy.	Elsewhere.	Total.
	<i>Francs.</i>	<i>Francs.</i>	<i>Francs.</i>	<i>Francs.</i>	<i>Francs.</i>	<i>Francs.</i>
Raw lumber	2,601,629	918,575	267,848	35,664	2,520	3,826,236
Firewood	2,192,600	96,892	65,472	59,410		2,414,375
Ebony wood	56,930	4,595	70,435	1,370	94,420	227,750
Other woods	573,543	25,010	976,043	69,337	119,936	1,763,869
Total	5,424,702	1,045,072	1,379,798	165,781	216,876	8,232,230

RATES OF SUPPLY AND DEMAND.

The annual consumption of wood per capita and per household of the population of the canton as compared with the natural supply of its forests, furnishes, as illustrated by the following table, an interesting and instructive subject for study. It shows, so far as Zurich is concerned, that her well-kept forests are unable to supply not only all the needs of her population, but barely two-thirds of that need, a condition which unfortunately prevails in many other parts of Switzerland, where a wood famine is constantly threatened and only averted by constant economy and vigilance:

District.	Popula- tion.	Number of households.	Average per capita of household.	Consumption of wood in cubic meters.		Yield of forests in cubic meters.	Consumption as compared with supply, in cubic meters.	
				Per household.	Total.		More.	Less.
Zurich.....	92,878	18,639	4.9	5.42	100,964	22,733	78,231	.....
Affoltern	12,818	2,561	5.0	6.0	15,366	13,481	1,885	.....
Horgen.....	27,840	5,858	4.8	5.80	33,947	16,148	17,799	.....
Meilen	19,788	4,307	4.6	6.0	25,842	7,806	18,036	.....
Hinweil.....	28,883	6,142	4.7	6.0	36,852	20,871	15,981	.....
Uster.....	17,293	3,667	4.7	6.0	22,002	12,687	9,315	.....
Pfäffikon.....	18,225	4,044	4.5	6.0	24,264	25,027	.....	763
Winterthur.....	38,318	8,054	4.8	5.81	46,787	40,670	6,117	.....
Andelfingen.....	17,527	3,634	4.8	6.0	21,804	23,183	.....	1,379
Bülach.....	20,682	4,184	4.9	6.0	25,104	27,518	.....	2,414
Dielsdorf.....	14,341	2,773	5.0	6.0	16,638	21,351	.....	4,713
Total.....	308,593	63,863	4.8	5.79	369,570	231,475	138,095	.....

PRIVATE FORESTS.

Allusion has been made above to the comparatively low yield of private forests in the canton Zurich, and it was remarked that imperfect care and cultivation were the principal causes. The cause in turn of this imperfect care and cultivation appears to lie in the fact that the so-called "private forests" consist in this canton alone of no less than 70,000 distinct small patches of woodland, some of them less than half a square acre in dimensions, and the largest not over 80 acres. This easily accounts for the lack of systematic cultivation, as contrasted with that applied to the cantonal, township and corporation forests. The following table shows the distribution of the private forests in the canton by districts:

District.	Total area of private forests.	Number of pieces of private forests.	Largest.	Smallest.	Average.	Number of owners.	Average owned by each owner.
	<i>Hectares.</i>		<i>Hectares.</i>	<i>Hectares.</i>	<i>Hectares.</i>		<i>Hectares.</i>
Zurich.....	1,430	4,170	38.00	0.01	0.34	1,299	1.10
Affoltern.....	1,409	3,848	7.20	0.003	0.37	1,126	1.25
Horgen	1,004	1,704	17.5	0.01	0.59	1,153	0.87
Meilen	1,310	2,441	8.28	0.01	0.54	1,392	0.94
Hinweil	4,650	6,986	36.00	0.01	0.67	2,940	1.58
Uster.....	2,026	5,085	10.08	0.02	0.40	2,381	0.85
Pfäffikon.....	4,720	10,874	16.00	0.01	0.43	3,115	1.51
Wintherthur.....	5,090	11,740	13.3	0.02	0.43	2,850	1.79
Andelfingen	1,908	7,410	7.56	0.02	0.26	2,238	0.85
Bülach	2,362	7,726	20.00	0.01	0.31	2,414	0.98
Dielsdorf	2,223	8,458	8.64	0.02	0.26	2,281	0.98
Total.....	28,132	70,442	38.00	0.01	0.40	23,189	1.21

TOOLS USED IN CULTIVATION.

As best illustrating the character of the tools and implements in use in the Swiss forestry service I quote from Professor Landolt's interesting report on the forestry department of the Swiss National Exposition of 1883. He says:

Among tree-chopping implements the polished, well-wrought axes of the pontoniers especially pleased the eye. In the hands of a lusty wood-chopper, well used to handling them, they unquestionably possess an advantage over the ordinary axe, yet on this side of the Alps workmen find it difficult to become accustomed to them. In Jura a good felling axe is in use, and one which is constantly growing in favor, and the more so for the reason that there are unfortunately so many other defectively constructed kinds in use. From present appearance, American axes are destined to come more in use, as they possess manifold advantages over ours, both in shape and material. It is still a question whether the American two-man saws, with the new system of teeth, are preferable to the Steyer bow-saws, with straight teeth, which are in ordinary use here. At all events they present a good appearance. There was almost a total absence of the old-fashioned frame hand-saws with reversible blade, notwithstanding they possess a decided advantage over those with fixed blades. The hand-saws which work forward and back deserve special notice, for the reason that in skillful hands they materially advance the work, but care should be taken not to make the frames too heavy.

Among the many pruning-saws for cutting away withered boughs we must give preference over all others to the simplest and cheapest kind, which is made out of the forward part of a good, old-fashioned scythe. Those fastened to poles, whether long or short, we cannot, on trial, recommend. If the pole be short, it is of little use; if long, it is uncertain for cutting. A light ladder of moderate length renders better service. Still less advisable, especially with coniferous trees, is the employment of iron bars. Among wedges, the split-wedge, which is quite unknown in many localities, merits special mention. For turning and sharpening heavy tree-trunks in the hill lands the turning-ring, the grip (goose-foot), and the "S" hook are still too little in use. For transporting timber down steep declivities tackle might be used more frequently—that is, in cases where there is a growth of young branches.

Among the implements of culture there are many which can find only a limited use, and the employment of which does not pay in every case. Good shovels and picks of good steel, not too heavy, single and double hoes (pick and bush hoes), and iron rakes are the most necessary and serviceable implements. Spades and picks of American make are to be highly recommended. Hewers and rakes are best chosen according to the forms in use in the several localities, provided, of course, they meet the requirements of cheapness.

By using the implements above mentioned, the forest owner has the advantage of not being obliged to provide a heavy stock of tools, as many workmen bring their own with them. In this connection the other implements of culture, such as are used in transplanting the smaller kinds of plants, should not be regarded as useless; there are times when they can render good service, and then is the time to employ them. In our large plant-gardens the furrow-plow is highly valued as forwarding and lightening labor.

The instruments for making forest surveys displayed great variety, although the work required of them is very simple. In this line invention is so active that it is difficult to keep pace with it.

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TRANSPORT OF WOOD.

The question of transporting wood from the comparatively inaccessible higher mountain regions to the place of consumption enters as a leading factor into the problem of rendering the cultivation of forests in such regions at all profitable. Wherever roads, passable either by wagons or sleds, can be maintained no insuperable difficulty is encountered; but many forests are located at points entirely inaccessible by such methods, and the devising of means for getting out the wood produced there, at paying prices, offers a broad field for energy and ingenuity. A vehicle known as a *schneegg*, half wagon half sled, is used, even in summer, in sections where the descent is very steep. But from points which no vehicle can reach the wood is generally got out by means of slides, made either of slats or of wire cables. This method is only resorted to when necessity compels, as, for instance, in getting timber over gorges, streams, narrow valleys, or rocky slopes. Of the two the wire cables are preferable, as standing more wear. Rafting is also resorted to whenever rendered practicable by the stage of water in the mountain streams, although it involves, as a rule, the loss of considerable wood, and occasionally much danger for the raftsmen, as well as damage to the banks of the stream. Where the latter are rocky there is no great harm done, but where walled in with fascines rafting must be prohibited, and where with stone-work must be limited to small wood. The transportation

of wood bound together in rafts (the above refers simply to single floating logs) will, wherever the depth of water and distance from the point of delivery permit, always remain the cheapest method of bringing it out from remote forests in the mountains.

PROTECTIVE CONSTRUCTIONS.

The topography of the country and the character of its water-courses render imperatively and generally necessary in Switzerland various constructions:

- (a) For the prevention of land or snow slides.
- (b) For the protection of the banks of streams.

The former consist simply in the establishment of palisade hedges, or the building of walls about three feet high and of moderate length at the points threatened. These are so placed that each in turn covers the gap where the other ends, and when the immediate danger is over they can be moved nearer together or farther apart, as may be necessary. This method has hitherto proved very serviceable, while attended with comparatively trifling expense. The choice between hedges or stone walls depends upon which of the two materials can more easily be found at hand. Where there is no soft soil, and piles or stakes cannot consequently be driven, stone must, of course, be used, unless a simple terracing of the rocky slope will answer the purpose; on the other hand, where there is a lack of stone, while stakes are plentiful, palisades are, of course, to be preferred. To surveyors and foresters are intrusted the protection and oversight of the constructions, in the shape of fascines, osiers, &c., along the banks of the mountain streams.

DAMAGES BY FROSTS AND STORMS.

Against the devastation wrought in forests by the elements man stands comparatively powerless. On the 20th of February, 1879, a hurricane swept across France from the Bay of Biscay and vented all its fury upon the forests of Switzerland, wrecking in a few hours the work of years, and involving a loss of 570,967 cubic meters of wood.

The detailed effects of this memorable tempest, as well as of two others occurring June 25 and December 5 of the same year, have been collected with admirable care and fidelity by the federal forestry bureau and published in a pamphlet, which accompanies this report. Similar exhaustive details (also inclosed herewith) have been published concerning the damage wrought by frost in the severe winter of 1879-'80, and the late frost of May 19 and 20, 1880. Again, in 1885, as early as September 28, a snow-storm of unusual severity visited Zurich and the adjacent sections of Switzerland, and wrought damage which undid in the neighboring Lihlwald the careful labor of a century. The snow fell to a depth of nearly three inches upon the entire forest, and resulted in a damage of about two cubic meters of wood to every square acre, or a total loss of 32,000 square meters. One observation resulting from this storm will prove of permanent value in forestry, namely,

that where coniferous growth was largely intermingled with the leaf-bearing, there the damage of the storm met its fixed limit and was arrested. In a few cases branches were broken from the firs, larches and pines, but not a single trunk among them was either split or broken, whereas among the leaf-bearing trees standing alone the devastation was complete.

ORGANIZATION OF THE FORESTRY SERVICE.

The control of the federal (protective) forests is vested in the central government; that of all other forests in the governments of the cantons to which they respectively belong. The technical superintendence of federal forests is vested in the chief inspectorate, which constitutes division three of the federal department of commerce and agriculture. In Zurich and most other cantons (Baselland, Baselstadt and Geneva excepted) the force is under control of an overforestermaster, and in this canton (Zurich) he is assisted by four district forestmasters. There exists also in most of the cities and in some of the larger towns a township forestry force, mostly composed of men scientifically trained. At the commencement of 1886 there were employed in all Switzerland 151 trained forestry officials, and from 1,500 to 2,000 foresters and overseers. According to the latest census (1880) forest culture and its kindred pursuits furnish employment to 5,851, and support to 9,095 persons. The *personnel* of the federal and Zurich forestry officials at present is as follows:

Federal.—Johann Coaz, federal overinspector of forests, Berne; Franz Fankhauser, jr., federal forest adjunct, Berne; Elias Landolt, Jacob Kopp, and Dr. Anton Bühler, polytechnic professors of the science of forestry, Zurich.

Cantonal.—Jacob Rueidi, overforestermaster, Regensberg; Gottfried Reinacker, forest adjunct, Zurich; Gottlieb Kramer, forestmaster first district, Zurich; Heinrich Keller, forestmaster, second district, Veltheims; Werner Wirz, forestmaster third district, Winterthur; Adolph Orelli, forestmaster fourth district, Bülach.

Township.—Ulrich Meister, forestmaster, Zurich; Kaspar Weinmann, forestmaster, Winterthur; Albert Bruspacher, forestry assistant, Winterthur; Heinrich Spiller, overforester, Elgg.

Board of examiners of forestry officials.—The overforestermaster, president *ex-officio*, Prof. Elias Landolt, Fluntern; Dr. Schröter, Fluntern; Professor Wild, Zurich; Professor Schulze, Hottingen.

The subdivision of the canton into four forestry districts, as provided in article three of the laws above given, is as follows:

First district.—Zurich (excepting Oerlikon and Seebach), Affoltern, Horgen, Meilen, and that part of Uster which includes the corporation and town forests of Dübendorf, Fällenden, Maur, and Elgg. Forest area, 7,342 hectares. Total area, 55,400 hectares.

Second district.—Uster (excepting the above named townships and the corporation Brüttsellen), Hinweil, Pfäffikon (excepting Kyburg, Hitau, Winterberg, Ryken, Tagelswangen, and Lindau), and that part of Winterthur which includes the townships Turbenthal, Zell, and Schlatt. Forest area, 7,687 hectares. Total area, 42,120 hectares.

Third district.—That part of Pfäffikon which includes the township of Kyburg and the corporation of Ottikon, Winterthur (excepting Pfungen, Wülflingen, Töss, Brütten, Zell, Schlatt, and Turbenthal), and Andelfingen. Forest area, 6,718 hectares. Total area, 36,720 hectares.

Fourth district.—That part of Uster which includes the corporation of Brutisellen, of Pfäffikon which includes the corporation of Lindau, Tagelswangen, Rykon, and Winterberg; of Winterthur, which includes the townships of Brütten, Töss, Wülflingen, and Pfungen; Bülach, Dielsdorf, and that part of Zurich which includes the corporations of Seebach, Oerlikon. Forest area, 7,276 hectares. Total area, 38,160 hectares.

I send with this report a set of pamphlets containing the series of inspections officially issued to the various grades of forestry offices, and by which they are to be guided in the discharge of their various duties. As supplementary to the law above given a study of these will well repay any commission desirous of organizing a practical forestry system.

INSTRUCTION IN FORESTRY.

The course of instruction in forestry at the federal polytechnic school in this city covers three years, the central government paying the expenses of the instructors engaged in the courses of training for subordinate employes for federal forest territory, and in the finishing courses. The former generally lasts for two months (in two terms, spring and fall), the latter from eight to twenty-four days. The following are the studies embraced in the courses, viz.:

First year.—Mathematics (and exercises therein); experimental physics (with recitations); inorganic chemistry (with recitations); introduction to forestry science; excursions; general botany (with recitations); zoölogy (with general reference to animals useful or hurtful in agriculture and forest culture); map drawing.

Second year.—Instruction in forest climatic influences; agricultural chemistry, first division; map drawing; topography; roads and water courses; general geology; pathology of plants; national economy (with recitations); microscopic practice; experiments in laboratory of agricultural chemistry; seminary exercises.

Third year.—Protection of forests, with applied zoölogy; forest formation; instruction in management of forests; excursions and experiments; general instruction in law; forest politics and police; history of forestry; geodetics; seminary exercise.

In addition to the above, during the summer semester, instruction is given in the following, viz.: *First year*—organic chemistry; special botany; petrography; meteorology; experiments in laboratory; microscopic experiments. *Second year*—field measurements; study of ground; preservation of various kinds of wood; forestry statistics; instructions in yield and increase of wood; instruction in law. *Third year*—statistics and calculation of value of forests; forestry legislation; use of forests, technology; and general knowledge of business.

Up to the beginning of this year (1886) there had been held fifteen training courses for underforesters (attendance 360), two finishing courses for the same (attendance 38), and seven tree-tending courses (attendance 116), toward the expense of which the sum of 23,754 francs was contributed by the federal government. In addition thereto it was resolved, March 27, 1885, to establish in conjunction with the polytechnic forestry school a central station for experiments in forestry matters, with a meteorological observatory attached, having as its object a system of thorough scientific experiments, examinations and observations, to develop the subject of forestry to its fullest extent, to achieve for it a recognized footing as a science, and to assist as well in the solution of important meteorological questions connected therewith. It may also here be mentioned that private societies for the furtherance of similar objects exist quite generally throughout Switzer-

land. The oldest of these, the *Schweizerische Forstverein*, has been in existence since 1842, and has since 1850 published a periodical known as the *Schweizerische Zeitschrift für Forstwesen*.

THE PROTECTION OF RIVER BANKS AND STEEP DECLIVITIES.

I forward a translated *résumé* of a very practical essay entitled, "*Die Sicherstellung unserer Flussufer und Rutschhalden*," recently published at Berne, by Herr Robert Lauterburg, a Swiss civil engineer.

"It is well known to every one," says the author, in introducing his subject, "what great inroads upon river banks and what heavy land-slides may be and already have been caused not only by running water, but often, as well, by apparently harmless rills and mountain springs. The amount of damage which these have already caused for our beloved fatherland certainly exceeds hundreds of millions of francs. Much has, of course, been done in the past to gain the upperhand of this evil; and while our engineering and forestry authorities have addressed themselves with all activity and intelligence to the task of checking the spread of this devastation, still it does not lie within their province (even were such a thing possible) to institute search in every direction and upon every piece of private property within the limits of which indications of dangers of this character are apparent, frequently long before they break out; or lawfully to compel the owners of the same to look after their own interests, even in cases where the public welfare appears to be endangered. But it is in precisely those cases where an authoritative system of protection can and should have unfettered operations that a government finds it is an impossibility, without the co-operation and vigilance of those immediately threatened, to trace up all the lurking sources of danger, or, even when the work of averting them is already in progress, to instruct at the same time and at the subsequent cost of the government itself those intrusted with it upon matters which the ordinary laws of engineering prescribe."

Therefore, Herr Lauterburg goes on to say, he publishes this essay with a view to instructing the public in general, as well as those charged with the putting down of protective constructions along the banks of river and streams, upon a subject which up to the present time has been far too widely overlooked, viz.: the cultivation, or recultivation, of threatened banks, and of declivities liable to land-slides, by setting out those kinds of trees and bushes which possess the qualities of strength, depth of root, and rapidity of growth. This method he proposes not only as a preventive, but, if adopted in season, as a means of arresting destruction already begun, as is shown by many successful efforts of late years. If all the trials made in this direction have not succeeded, it is because they have encountered unforeseen circumstances, rendering all human force and intelligence futile. Who, for instance, could have foreseen twenty years ago that a rainfall would, since then, have increased in the proportion of from three to five, and that, in many localities, the imprudent cutting away of forests in the mountains would, notwithstanding so many warnings, have been on the increase, instead of decreasing? While in some

places the evil has been to some extent remedied, in others there has prevailed such a mania for tree-cutting that, only a few years ago, an inundation came and caused over fifty million francs worth of damage in two of the most fruitful and beautiful sections of the country.

In any case, it will be admitted that "an ounce of prevention is worth a pound of cure." Instances can be adduced where an outlay of a hundred francs at the proper time would have saved millions. Of these the author mentions one especially, that of the Nolla, a stream near Thusis, in canton Graubünden, which has lapsed into such a condition that after every thunder-storm it pours down immense masses of earth, mud, and rock into the valley; and how many similar streams are there to be found in Switzerland which, in the beginning, by aid of slight constructions, might have been kept within their natural bounds as brooks and rivulets, instead of, as now, frequently swelling to torrents, sweeping everything with them. And how has this come to pass? Simply thus, that after the cutting away of the forests around the sources, the rainfall, instead of being absorbed by the trees as formerly, pours in simultaneously from all sides in great masses into the bed of the stream, washes it away, undermines the banks, and finally sweeps away the entire mass of rubbish down into the valley. The first inquiry of the author is, therefore, directed to ascertaining what precautions may be taken to prevent this state of things where not already existing. Manifestly, he replies, by studying carefully, in the first place, the nature and sources of the streams, inasmuch as in these lies, in almost every instance, the original cause of disaster and damage.

Such cause may, for instance, be found at the source of a brook where the spring has become blocked up, and consequently bursts forth at some unexpected point. Now, if the subsoil is partly composed of gypsum or of projecting and unsupported earth or rock stratum, with intermediate layers of clay, &c., the entire mountain may in time be carried away by the action of the water; in fact, more than one locality can be cited where, from a similar cause, land and buildings are moving, slowly, it is true, but yet at a rate which can be measured. But yet, in face of the fact that, on account of this movement, numerous house repairs, and indeed entire protective structures are rendered necessary, the good people still cling to their native sod and no warning serves to awaken them to a proper care of their water-courses.

* * * * *

The dangers which even the smallest rivulet may carry in its course do not, as before stated, necessarily lie in the substratum from which it springs, or into which it frequently sinks unperceived; they may also be found in the bed over which it—and to all appearances harmlessly—runs, as when, for instance, it consists of broken or projecting clay, or the danger may originate in the careless cutting away and rooting out of trees at the confluence of the sources, that is from the steep declivities about them. Where both these causes exist, the evil will increase with proportional rapidity, but seldom so rapidly as to attract the attention of an absent-minded or negligent owner. Even when he realizes the gravity of the situation, he soon comforts himself with the remark, "Well, it has been going on for a long time; it can't be very dangerous."

In instances such as those referred to, where damage to a piece of land has already begun, even in the smallest way, it is recommended to replant the cleared slopes, in the fall or the spring, and to put down at the threatened points in the brook artificial constructions of green wood, with adequate strength for resistance, but free from sap.

How these constructions are to be managed, continues the author, has been fully explained in previous publications. The replanting of cleared slopes and the banks of streams will be treated of further on in this essay. In order to spare the trouble of research on the former point the following facts are recalled in regard to the artificial construction of brooks running over uncertain beds as having a tendency to carry off deposits of earth after heavy storms. The damage which even the most insignificant rivulet can cause when swollen to the bed over which it runs; when the latter is made of bad, *i. e.* loose and spongy earth, consists in eating it away, a damage the extent of which is, of course, proportioned to the fall of the water. This can be best and most cheaply counteracted by so-called "overfalls" (cross-beams), which sufficiently diminishes the fall of the stream; only it must be seen to that the requisite number of these are constructed at proper points and in durable form. Without going deeply into the subject of construction theories, unintelligible to the general reader, the author contents himself with stating merely the following practical rules, *viz.*:

The simple inspection of a water-course will determine whether it needs any artificial constructions or not.

Such will, of course, only be needed at points where the bed of the stream is badly washed out, or eaten away.

Inasmuch as at all points where the mere dropping in of a stone or putting down of fascines does not afford adequate protection the flow of water must be checked; that is to say, its fall must be lessened, and consequently its level heightened. It will be necessary in such case to construct an "overfall" at some proper point lower down. This should be repeated at every point not immediately secured against farther washouts.

But an artificial fall, inasmuch as it augments the danger of the washing away of the earth immediately under it, must, all the more for this reason, be located at a point where the earth is firm, and in case such a point cannot be found below the washout then some such course as the following should be adopted: Lay a solid plank or several cross pieces across the brook so that they are sufficiently imbedded in the bank and background, and reinforce the sides of the stream both above and below with pieces laid lengthwise so that the water can find absolutely no outlet at the sides; but be careful at the point upon which the falling water strikes to either place a very heavy stone or to shield it with wood or green osier work in such a manner that the stream cannot undermine it or the earth around it.

Detailed instructions as to the driving of stakes and putting together of materials at the different points must be left to the practical common sense of the owner immediately concerned or of the expert who may be called in for the occasion. It is, however, recommended, with a view to the permanent safety of the shores adjacent to and on both sides of the "overfall," that they be planted either in the fall or spring with suitable poplars or willows.

"Where a brook has cut so deeply into its banks that they are in danger of caving in, the preservation of these latter must be looked after. In the simpler cases, this is effected by placing osier works in position, and this is to be done in the fall or at latest in the spring, the

osiers to be made with twigs or plants of the species of woods enumerated further on. In cases where this running water has burrowed very deeply and loosened the mountain sides for a space of considerable height and breadth, no remedial measures can be of avail, the force of external circumstances sufficing to neutralize all human endeavor. And this prompts the inquiry whether it can be right and reasonable thus to jeopardize public and private interests and to an extent beyond calculation. When, however, as is often the case, through the blindness, indifference or neglect of those immediately threatened, matters reach such a desperate stage, as for instance in the case of the Nolla, where the constantly increasing deposit of masses of loam may ultimately stop up the course of the stream itself and cause the greatest devastation, both above and below, under no circumstances should such a district be left to take care of itself, cost what it may. And all the more urgent and important is it that when these constructions are intrusted to private parties or town authorities, they should be carried out in a manner combining the lowest expense with the greatest and most rapid efficiency. To this end is this well-meant advice from a practiced expert designed, and it is in this intention that he thus addresses himself directly to the public, knowing as he does that the method in question is a well known one which has already, in many instances, been applied by higher technical authorities, and which, therefore, does not need to be commended to their notice beforehand; but that the theory of planting around the remotest sources of springs, points to which ordinarily the authority of the official world does not reach, and the theory of putting down artificial constructions along the banks of private streams, and of insuring the preservation of private dams, may come in time to be known, recognized and carried into effect—this is the especial aim of this work.

* * * * *

The method referred to, and which can be applied almost without cost, and with the utmost success in all cases where the preservation of land or the putting down of constructions along water-courses is concerned, consists simply in the timely and systematic planting of declivities and imperilled banks, as well as the dams and osier works, with suitable species of trees and bushes.

* * * * *

But conditions vary so greatly, according to locality, that it is impossible to establish rules adaptable to all, and much must consequently be left to personal judgment as to what, under particular circumstances, is to be modified or amplified.

The chief rules for guidance are, briefly stated, as follows:

1. Planting, whether by sowing seed or setting out twigs and plants, must positively be done only in late fall or in spring,

2. The choice of plants from among the list given below is, of course, not strictly prescribed, but is indicated by the table. As an average rule it may be held that no trees which grow to a great height should be planted on steep slopes, and that none are to be planted upon the bed of a stream elsewhere than behind the line of the dam; also that, to some extent, the elevated points, as well as the sunny and shady sides of the place of planting, are to be looked after. As the trees and bushes given in the table are of domestic growth, or easily domesticated, any expense in procuring them from elsewhere can only occur in exceptional cases. By far the most of those mentioned further on have long grown and flourished on the shores of our streams, but mixed with other species resembling them yet absolutely worthless. This mingling of species must positively be avoided.

3. The table given below designates which species are to be sown, and which set out as plants or twigs. There are, however, exceptions to this rule also.

4. In order that the species mentioned may not so easily be confused with others, which is quite apt to occur in regard to willows, for instance, and in order, further, that where large numbers of plants are used there may always be a supply of the right kind on hand, it is advisable to establish larger or smaller nurseries. In other countries there are localities where

every township has a nursery which it maintains. For the management of these nurseries, as well as for putting into operation the other feature of this method, the employment of a practical forester or gardener is recommended.

5. In making up the list given further on, only such species of trees and bushes are considered as—

(a) Those which can stand the climate of Northern Switzerland.

(b) Those which develop a rapid, copious and sturdy growth of roots.

(c) Those which grow easily on river banks require no rich soil, and can hold out, even for a considerable period, against inundations.

(d) Those which require no great care, and which are of a kind yielding a certain quantity of wood.

6. Seed and slips are to be planted from 30 to 45 centimeters deep, varying according to the sunny or frosty nature of the locality, and the openings should be carefully refilled with good earth and at sunny spots covered with leaves or branches. For shoots, a deep hole of 30 to 45 centimeters should be made and widened out with a pointed iron, and the shoot then carefully placed deep down in it, with the eyes upward; the space should be then filled in with good earth and pressed down. The intervals between the plants and rows may be made from a meter to a meter and a half, according to whether one or several plants are set out in one opening. For shoots, an interval of 60 to 80 centimeters suffices.

7. Bushes with thick stocks such as alders, birches, acacias, &c., should be cut every six to ten years, in order to make their roots spread out in all directions with greater strength, thereby contributing to render the ground compact about them.

8. The planted spots should be gone over yearly and in the fall reinforced with new slips or shoots wherever from any cause those originally set out are backward. In public enclosures the person intrusted with the planting should be bound by guarantee to do this replanting at his own cost, but should at the same time be so paid for his work as to enable him to assume this, to a certain extent, unavoidable risk.

9. Although as between steep declivities and level river banks the process of planting is entirely different, yet this difference will, from the nature of circumstances, make itself apparent to a practical and experienced planter, so that it is only necessary here to refer to the collective instructions below.

10. In putting down osier work and fascines, care should be taken, regardless of subsequent planting, that the entire material used is chosen from the same species of wood and that it is put into the ground at the times when the sap is out of it, that is, between late fall and spring.

Commenting on these simple preventive measures the author goes on to say that if they are carefully carried out two or three years will suffice to furnish a compact and indestructible growth of bushes in lieu of the expense of annual renewal and repairs. Instances can, in fact, be pointed out where constructions of this character, very light and without any masonry, *but put down at the proper time*, have, by means of the dense overgrowth upon them, acquired a compactness which nothing can sever. What a saving is here! Instead, as has been customary, of using timbers and osier-work to hold masonry together, why not impart to this wooden ligature a living and growing strength when it costs so little and is so easily provided? It will, of course, be understood that where good stone can be had masonry is preferable, and that in running waters, carrying down at times great pieces of rocks, no osier-work is available as a means of protection. Still in many cases a dense planting of the shores with strong and suitable trees, in single or double rows (alternately covering each other's gaps), is not to be rejected, and the

author adds that he has himself had avenues of ornamental trees set out on slopes already somewhat gullied, and found that after a subsequent adequate spread of root they grew thriftily.

Concerning declivities in process of being carried away by the trickling of springs beneath them, the author remarks that no staking or planting could, of course, avail so long as the flow of water is not entirely cut off or completely brought under control and led off elsewhere. In the first place, the interior of the hill and its *substrata* must be looked after, *i. e.*, drained off, and not until then can its exterior surface, if still required, be rendered firm by a growth of trees of moderate height.

In the table on pages 238 and 239 the author gives alphabetically, under their latin names, the trees and bushes most available for the object stated.

In concluding his essay the author calls attention to the sodding of the ground as an important factor for rendering it compact and covering it, as well as in protecting the seeds and tender plants on sunny exposures. The importance attached in other countries to this protective measure is shown by the pains taken to transport sods from the low grounds to wild and elevated barren slopes to protect plants from the north wind, and also by the strewing of grass-seed, which is capable, within a short time, of forming, even in the roughest soil, an impenetrable network. For sodding in high land, esparcet, mixed with bibernelles, feed-grass, tare, meadow-oats, Spanish clover, &c.

DEALERS IN SEEDS AND PLANTS.

Where so active an interest is officially shown in all that pertains to the growth of trees and plants it is but natural that a correspondingly active commercial interest should exist. There are in this city a number of enterprising dealers in this line of products whose names and addresses I give herewith :

Name.	Residence.	Canton.
Dürr, Emil.....	Marktgasse, 15.....	Zurich.
Dürr & Co., Titus	Bohnhofstrasse, 104.....	Do.
Froebel & Co.....	Poststrasse, 3.....	Do.
Köchlin, A.....	Schiffändeplatz, 2.....	Do.
Müller-Köchlin	Ed. Storchengasse, 16.....	Do.
Traub, Benno.....	Beatengasse	Do.

Species.*	Tree or bush.	Soil.	Locality and altitude.	How planted.	Rate of growth.	Strength and form of roots.	Remarks.
1. <i>Abies excelsa</i>	B.	Almost any	1,800-2,100 meters.....	Plant a and seed.	Medium rapid	Wide-spreading, lateral...	Medium yield of wood.
2. <i>Ailanthus glandulosa</i>	B.	do.....	Prefers lower levels.....	Root, shoots or seed.	Very rapid.....	Very copious	Hard wood; does not bear cutting; comes from China and Japan, and is somewhat sensitive to frost.
3. <i>Alnus glutinosa</i>	T. and B.	Deep gravel and moor by water.	Up to 1,000 meters.....	Seed or shoot from stock.	do.....	Rapid and wide-spreading growth of root especially after pruning.	Of insignificant value for wood. By knocking off the leaves a strong soil is formed about it. To be cut every 6 to 10 years.
4. <i>Alnus</i> . { <i>incana</i> } { <i>viridis</i> }	T. and B.	Deep gravel (dry or moist).....	Up to 1,400 meters.....	Plant or seed.....	At first very rapid.	do.....	Of great value for firewood. In every way specially recommended. In other particulars see foregoing.
5. <i>Fraschinus excelsior</i>	T.	Deep, spongy, moist, stony, mixed with earth.	Up to 1,300 meters.....	do.....	Quite slow.....	Deep, with wide-spreading shoots.	Fertilizes by its copious fall of leaves; yields a good wreath-wright's wood; is somewhat sensitive to cold.
6. <i>Hyppophoea rhamnoides</i>	B.	Dry or moist, but thin.....	Up to 1,000 meters; sunny exposure.	do.....	Quite rapid.....	Copious and intertwining growth.	In every way recommended as a compact, twining shrub; should be cut from time to time.
7. <i>Pinus Austriaca</i>	T.	Cliffs and gullied clay beds.....	Middle levels	Seed	do.....	Spreading	Very resinous; comes from Austria-Hungary.
8. <i>Pinus</i> . { <i>Cembra</i> } { <i>Montana</i> }	T.	Deep and gullied cliff soil, with earth filling.	800 meters; up to limit of snow.	do.....	Slow	Deep and strong intertwining roots.	Yields a fine hard wood, useful in manufacture of furniture.
9. <i>Populus Alba</i>	T.	Moist, wet, thin, but not without earth.	Assumes bushy form according to altitude; stands any degree of cold.	Shoot or seed.....	Light and rapid.	Strong growth under ground.	Spreads widely by flying seeds and by root sprouts.
10. <i>Populus Nigra</i>	T.	Spongy, deep, watery, with some earth.	Up to 800 meters.....	Shoot.....	Very rapid.....	Strong growth.....	Suffers somewhat in heavy cold; yields a light and glutinous wood; takes rather the form of a bush in stony soil devoid of earth; owing to its length and toughness is available for alkali of dams.

11. <i>Populus Tremula</i>	T.	Sandy, gravelly strand, with one subsoil.	Up to 1,200, or, at most, 1,400 meters.	Root sprout.....	Rapid when young.	Strong growth.	
12. <i>Quercus pedunculata</i>	T.	Deep, loamy, sandy, middling, moist to wet.	Hardly above 900 meters.	Plant or seed..	Medium	Only a strong, deep root which later puts out vigorous shoots.	
13. <i>Robinia pseudo acacia</i>	T. and B.	Dry, sandy	In lower levels.....	Plant and seed; buds copiously.	Very rapid....	Strong growth of roots in all directions, especially after cutting.	Wood highly valuable, hard and enduring; sensitive to early and late frosts.
14. <i>Salix amygdalina fusca</i>	T. and B.	Sandy and moist.....	Up to 900-1,000 meters.	Shoot: to be set in deep.	do.....	Strong and deep	Soon puts forth many strong and high branches, which are, however somewhat fragile.
15. <i>Salix caprea</i>	B.	Calcareous, fresh loam, and earthy sand.	Up to 1,400-1,600 meters.	Seed	Rapid.....	Extraordinary growth of root and shoots, displacing nearly all others.	
16. <i>Salix</i> . { <i>nigricans</i> } { <i>acutifolia</i> }	B.	Anywhere, especially in bogs and moors.	Up to 1,800 meters.	Shoot	Rapid like willows.	Copious, but not very strong.	Found by the writer growing in the wildest, stony localities and on overflowed ground.
17. <i>Salix purpurea</i>	B.	Sandy, gravelly strand	Up to 800 and, in the sun, 1,300 meters.	do.....	do.....	Copious and thin	A willow of the finer kind; otherwise, see foregoing.
18. <i>Salix</i> . { <i>repens</i> } { <i>argentea</i> }	B.	Sandy, gravelly, moory soil....	Up to 1,130 meters.	do.....	do.....	Copious, but not very strong.	Contributes perceptibly to rendering the soil compact.
19. <i>Salix viminalis stricta</i>	T. and B.	Anywhere, but mixed with earth.	About same as foregoing.	do.....	Grows fast and high.	Strong and copious.....	Especially recommended.
20. <i>Viburnum opulus</i>	B.	Dry, calcareous soil, mixed with earth.	Up to 1,430 meters, in the sun.	do.....	Quick and strong.	Strong after cutting	

* N. B.—Drawings of Nos. 2, 3, 4, 6, 7, 10, 14, 15, 17, and 19 are given in the illustrations which accompany this report.

BOOKS ON FORESTRY FORWARDED HEREWITH.

As supplementary to or corroborative of the facts contained in this report, I have collected from various official and other sources a number of works bearing on the details of Swiss forestry service, and forward the same herewith, as being of great value for reference in the framing of a forestry system in our own country. These works are as follows:

1. Dienst-Instruktionen für den Oberforstmeister des Kantons Zürich.
2. Dienst-Instruktionen für die Förster über die Staats-Waldungen des Kantons Zürich.
3. Dienst-Instruktionen für die Gemeinde und Genossenschafts-Förster des Kantons Zürich.
4. Kanton Zürich. Forstgesetze.
5. Vollziehungs-Verordnung zum eidg. und kant. Forstgesetze, vom. 26. April 1879.
6. Forst-Statistik des Kantons Zürich.
7. Bericht des eidg. Handels- und Landwirthschafts-Departements über seine Geschäftsführung im Jahr 1885.
8. Die Stürme vom 25. Februar, 25. Juni und 5. Dezember 1879, &c.
9. État der schweizerischen Forstbeamten, &c.
10. Mittheilungen der Anstalt zur Prüfung von Baumaterialien am eidg. Polytechnikum in Zürich.
11. Die Lauinen der Schweizer Alpen, von J. Coaz, eidg. Ober-Forst-Inspektor.
12. Der Frost-Schaden des Winters 1879-80, &c.
13. Instruktion für die Detailvermessung der Waldungen, &c.
14. Programm der eidg. polytechnischen Schule in Zürich, für das Schuljahrn 1886'-87.

GEORGE L. CATLIN,

Consul.

UNITED STATES CONSULATE,

ZURICH, *April 25, 1887.*

SWISS FEDERAL FORESTRY LAW.

[Adopted March 24, 1876.]

1.—Federal supervision.

ARTICLE 1. The federal union shall have supervision of the forestry service in the Swiss mountain districts.

ART. 2. This supervision embraces (1) all the territory embraced in the cantons of Uri, Schwyz, Unterwalden, Glarus, Appenzell, Graubunden, Tessen, and Valais, and (2) the mountainous sections of the territory of the cantons of Zurich, Berne, Lucerne, Zug, Freiburg, St. Galle, and Waadt. The boundary lines determining what mountainous sections of the last-mentioned cantons are to be subject to federal supervision, shall be established by the national council jointly with the several cantonal governments. In cases of failure to agree as to forestry lines, the federal assembly shall decide.

ART. 3. All protective forests, as well as cantonal, township, and corporation forests (even when not classed as protective forests), within the federal forest territory come under the control of the federal union. To private forests, when not classed as protective ones, the provisions of articles 11, 14 (Lemma 2, 3, 4), 15, 20, and 27 (Nos. 2, 4, 8, and 9) are alone applicable.

ART. 4. Under the term "protective forests" are to be understood those which by reason of the great altitude of their location, or of their situation on steep mountain shelves, rising grounds, ridges, and projections in marshy tracts or narrow passes, or crusted earth, or the banks of brooks or rivers, or owing to a deficiency of woodland, serve as a protection against injurious climatic influences, and damage by winds, avalanches, falls of rock or ice, landslides, wash-outs, or inundations.

ART. 5. Within a limit of two years the protective forests are to be set off from the other forests by the cantons. Such separation, when made, is subject to examination and approval by the national council.

ART. 6. The several cantons shall issue the necessary decrees and ordinances for carrying out the present law, and transmit the same to the national council for examination and approval. The latter shall superintend their execution, appointing for that purpose an inspector of forests and providing him with the requisite number of assistants.

II.—*Classification of forests and forestry officials.*

ART. 7. The cantons and parts of cantons embraced in the federal forestry system are to be districted by the cantonal governments according to the requirements of the organization of their several forestry systems.

ART. 8. For the maintenance and administration of the forestry law, the cantons shall employ and pay the requisite number of trained foresters.

ART. 9. It shall be incumbent upon the cantons to train subordinate forestry officials by holding councils of instruction.

III.—*Regulations concerning the maintenance of forests and rights of ownership therein.*

ART. 10. Within a period not to exceed five years all forests subject to federal supervision shall be marked out. In a case where forests adjoin, the marking of the outer boundary line of the forestry district to which they belong will suffice.

ART. 11. Within the established limits no diminution of forest area is permissible without the consent of the canton, and in future barrens and clearings shall be replanted where no equivalent area of other land is turned over for tree-planting. The digging out of roots is prohibited, (a) in protective forests, (b) when it imperils the welfare of protective forests. Exceptions to this rule can only be allowed by special consent of the national council.

ART. 12. There shall be no distribution of cantonal, township, or corporation forests, either for purposes of usufruct or ownership, save in extraordinary cases, and in such the decision shall be vested in the cantonal government.

ART. 13. Township and corporation forests shall only be sold with the consent of the cantonal governments.

ART. 14. Wherever rights of pasturage, leaf-gathering, or otherwise pertain to protective forests, the same are to be dissolved wherever incompatible with the purposes for which the forests serve. This provision shall be carried into effect within a period not exceeding ten years. Wood-cutting rights in forests subject to federal supervision can be dissolved by the owners of the land. Indemnification may be made either in money, or, when that, under existing circumstances, is impracticable, by the transfer of an equivalent area of land. The manner of dissolving the rights above mentioned, and the legal steps to be taken in regard thereto, shall be determined by cantonal legislation. It is forbidden to contract any new rights of the character mentioned.

ART. 15. All business rights conflicting with articles 11, 12, 13, and 14 are null and void.

IV.—*Forestry regulations.—New inclosures.*

ART. 16. All government, township, and corporation forests shall be surveyed, their management regulated, and plans for their cultivation introduced. The fixed tributes imposed on a basis of the deficiency in yield shall not be exceeded. Whenever, owing to extraordinary

circumstances or in consequence of unauthorized use, the deficiency in yield proves excessive, such abnormal lack in wood-supply must be made up in subsequent years.

ART. 17. For forests in which at first no definite plan of cultivation can be introduced, there shall be fixed, during the first five years during which the present law is in force, a yearly estimate of yield by means of temporary cultivation, and measures shall be taken for the use, replanting, and care of the same.

ART. 18. The regulating of the use of wood from private forests pertains to the several cantons, subject to the provisions of this law.

ART. 19. It shall be the duty of the cantonal governments to adopt all measures of cultivation and safety necessary to maintain the protective forests (art. 3), and to insure the object for which they are established.

ART. 20. In these forests the usual pursuits kindred to forest culture, viz., the pasturage of cattle and the gathering of leaves are to be kept within certain limits, or, at times, suspended or entirely discontinued. The full or conditional following of these pursuits shall be regulated in accordance with the requirements of proper cultivation.

ART. 21. Tracts of land, through the planting of which protective forests of any considerable value can be obtained, shall be so planted upon the demand of either the cantonal government or the federal council. Of the expense of the first planting and of the subsequent improvements, which, within the first four years after the setting off of the forest, shall, in the opinion of the national council and without fault of the owner of the forest, become necessary, a share shall be borne by the canton and by the federal government.

ART. 22. In case the land to be planted belongs to a private individual, the canton is entitled, and, if the owner request it, obliged to demand a transfer of the same, with payment of full indemnification, under the provisions of the national law pertaining to obligations connected with the transfer of private rights, dated May 1, 1850.

V.—Contributions by the National Government.

ART. 23. The national government shall contribute to maintaining the courses of instruction provided for in article 9, and shall arrange jointly with the cantonal authorities for the establishment of the same.

ART. 24. The national government shall further contribute to (1) new forests (articles 21 and 22), (2) planting of trees in protective forests (article 4) in so far as the same are (a) of great importance as a means of protection against danger to land, and more especially when in connection with protective constructions (*Verbauungen*), and (b) when effected under great difficulties.

ART. 25. The national council fixes the amount to be contributed with regard to the budget, and within maximum and minimum limits, as follows, viz:

1. For the establishment of new forests (article 24, figs. 1 and 2), from 30 to 70 per cent. on the actual cost.

2. For the planting provided for under fig. 2 of the same article, from 20 to 50 per cent.

These amounts, however, will be paid over to the cantons only for new inclosures of protective forests, according to article 24, fig. 1. The contributions are not to be paid over to the cantonal government by the national council until the latter is assured by a report from the federal inspector of forests that the work has been performed as described, and correctly charged for.

ART. 26. With reference to contributions, the cantonal government assumes an obligation to the national government to protect and care for the new plantings and to provide for subsequent improvements.

ST. GALLE, APPENZELL, THURGOVIE AND GRISONS.

REPORT OF CONSUL STAUB.

There are three kinds of forest laws existing in this country, as will be shown in this copy, viz., federal, state and district, all of which cover in substance the same ground, while each of them differs somewhat from the others, according to the requirements of their respective localities. However, all are subordinate to the federal authority.

The statement which will follow next shows that these cantons differ widely in regard to the ownership of forest land. In some cantons the private interest is largest, while in others the communes and districts own the most. The states, as an average, have either very small or no claims at all, while the federal government has no forest land of its own.

Forest Areas.

States (cantons).	Number of acres of the entire surface.	Percentage in forests.	Number of acres of forest.	Percentage of forests belonging—		
				To the state.	To the communes.	To privates.
	<i>Acres.</i>	<i>Per cent.</i>	<i>Acres.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>
St. Galle.....	561,600	16.4	92,100	2.7	59.8	37.5
Appenzell	115,500	13.5	16,000	.....	8.	92.
Thurgovie.....	274,000	18.3	50,300	4.5	34.4	61.1
Grisons.....	1,946,600	17.0	330,600	.....	95.	5.

The lumber trade in this part of the country is of little importance both in regard to exportation and importation; the duty on rough timber and firewood imported is very small, almost nominal, while sawed lumber per car (20,000 pounds) pays 40 francs (\$7.60).

The largest house in this consular district dealing exclusively in forest seeds is in Zernetz, canton Grisons, but the most of such seeds is furnished by Tenewein at Innsbruck (Austria) and Keller at Darmstadt (Germany), and others. Cantons and communes are compelled by law to keep their own nurseries.

PETER STAUB,
Consul.

UNITED STATES CONSULATE,
ST. GALLE, *December 31, 1886.*

[NOTE BY THE DEPARTMENT.—The law transmitted by Consul Staub is essentially that printed in Consul Catlin's report.]

[NOTE.—*The following reports were received at the Department too late for insertion in their proper places.*]

AUSTRIA-HUNGARY.

REPORT OF CONSUL GILBERT.

THE statistics are in the main derived from the Ritter von Guttenberg of this city, who is at the head of the forest administration in this part of the empire of Austria.

The general character of the larger portion of territory embraced within this consular district is so very singular that, considering also the peculiarity of the climate, it appears doubtful if the ordinances and methods, which I have to report, will be found of much practical value in the United States. Permit me to devote a few paragraphs to these points.

The traveler approaching Trieste from Vienna by railroad crosses, about twenty miles east of the city, a ridge and sees below him a deep and rather fertile valley watered by the small river Reka, bounded by rounded, barren, stony hills, in a few cases rising to the dignity of mountains; he soon finds himself upon a high table-land diversified by a few low ridges, the surface almost covered with light-gray broken limestone, which twenty years since was rarely relieved by scattered dwarfed oaks and a very scanty vegetation. The great cave of Adelsberg, about thirty miles (air line) east northeast from Trieste, is in this limestone formation, and all the vicinity of this city is undermined by caves and grottoes. The Reka, above named, flows into the grotto of San Canzian and is lost. Whether Vergil's Timavus, about fifteen miles northwest of Trieste, be the outlet of the Reka is not fully decided; if so, twenty centuries have reduced the nine mouths through which it plunged into the sea to three.

Another river at Pisino, in Istria, passes in like manner into a cave and is lost.

This surface of broken limestone, deprived of moisture by the subterranean channels, is called in German *karst*, in Italian *carso*.

The limestone formation extends from near Gorizia, along the Gulf of Trieste, and thence south and east, so as to include Istria, a part of Croatia, Dalmatia, the Herzegovina and West Bosnia.

Generally, valleys excepted, whenever the declivity is toward the sea, both the declivities and the table-lands are sterile, desolate karst. A feature—

in some districts a striking one—of the karst is its red earth (*terra rossa*), decayed limestone colored with oxide of iron. It is very fertile when well supplied with moisture, and where forests are well rooted in it some of the finest timber of the empire is to be found.

Geologists attribute the existence of karst entirely to the ignorance, folly, and greed of man. It is known that in antiquity all these coasts were covered with forests, which fell before the demands of commerce, until not a tree was left that by the means of conveyance in those ages could be brought to the shore for shipment. The map of these countries shows at a glance that karst is confined to the great basin in which the Adriatic lies; that north of it are the east ranges of the Austrian Alps; and that the immense difference in the temperature between the atmosphere of those snowclad mountains and that of the named sea, open to the Mediterranean and the influence of the African Sirocco, necessarily produces dry, cold winds of extraordinary violence and long continuance.

The laws of nature are uniform in their action, and the history of the karst may yet be repeated in our own vast territory unless its lessons be respected. The soil, denuded of trees, parched, dried, and pulverized by the hot sun of this climate, was swept away by the rains, which, being no longer retained in the shades and decaying foliage, flowed off in torrents. The surface of the exposed limestone disintegrated under the combined effects of atmospheric and aqueous action. Fissures in the strata became enlarged into "dolines," which may be described as funnels opening below into subterranean channels, and thus another cause of aridity was added. And so, in the lapse of long centuries, the forest covered coasts of the Adriatic became the desolate karst of to-day. Here and there deep valleys sheltered from the winds and well watered are very pictures of fertility, when no long continued drought deprives the springs of their sources; but with such exceptions, and in districts where long continued cultivation—as in much of Istria—has effected a change, most of the eastern coast lands of the Adriatic, in the provinces above named, are such as described.

The existence in the last century of a few fine forests under favorable and exceptional circumstances, proves that nature is not at fault for the widespread karst.

During the long possession of these coasts by Venice, the republic, which plundered the forests of Dalmatia without mercy, sought vainly, by its ordinances, to protect and enlarge those of Istria, Trieste, and Gorizia. The Austrian government has also, for three hundred and fifty years, endeavored by its forest laws, with heavy penalties for disobedience, to at least give the opportunity for forests to grow; but with little effect.

By the best calculation it is in my power to make, about one-third of the area included in the provinces of Gorizia, Trieste, Istria, Carinthia, Dalmatia, Croatia, Herzegowina, Bosnia, and the islands of the Eastern Adriatic, is karst.

From this short general notice of the peculiar geological character of this consular district, I beg leave to turn to the queries of the circular.

Table No. 1.

Province.	Description of forests.	Area of state forests.	Area of commune forests.	Area of private forests.	Total areas of forests.	Area of the provinces.
		<i>Hectares.</i>	<i>Hectares.</i>	<i>Hectares.</i>	<i>Hectares.</i>	<i>Perct.</i>
Austrian-littoral (Trieste, Istria, Gorizia.	Deciduous.....	11,587	18,602	15,905	46,094	
	Coniferous.....	1,513	40,554	145,552	187,619	
	Aggregates.....	13,100	59,156	161,457	233,713	30
Dalmatia.....	Deciduous.....	3,103	14,880	14,490	32,473	
	Coniferous.....	2,540	272,749	74,000	349,289	
	Aggregates.....	5,643	287,629	88,490	381,762	30
Carinthia.....	Deciduous.....	16,365	3,110	435,534	455,009	
	Coniferous.....			1,862	1,862	
	Aggregates.....	16,365	3,110	437,396	456,871	44
Carniola.....	Deciduous.....	12,166	18,356	340,787	371,309	
	Coniferous.....	212	2,308	68,480	71,000	
	Aggregates.....		20,664	409,267	442,309	44
Styria.....	Deciduous.....	59,823	27,377	936,384	1,023,584	
	Coniferous.....		1,144	50,413	51,557	
	Aggregates.....	59,823	28,521	986,797	1,075,141	48
Tyrol and Vorarlberg.....	Deciduous.....	112,221	467,884	372,236	952,341	
	Coniferous.....	1,349	110,370	40,886	152,605	
	Aggregates.....	113,570	578,254	413,122	1,104,946	38
Grand total.....	Deciduous.....	215,265	550,209	2,115,336	2,880,810	
	Coniferous.....	5,614	427,125	381,193	813,932	
	Aggregates.....	220,879	977,334	2,496,529	3,694,742	

Prospectus of the work of afforestation as performed by the forest commission, of the territory of Trieste, for the years 1882 to 1886, inclusive.

Districts.	Area af- forested.	Holes ex- cavated.	Young trees planted.	Seed sown.	Dry walls erected.	Expense.					Remarks.
						Excavation of holes.	Planting.	Transpor- tation of earth.	Sewing, includ- ing cost of seed.	Erection of walls.		Total expense.
Banne.....	Hectares. 6.56	Number. (*)18,986	Number. (*)18,986	Kilos. 50	Meters. 355	Florins. 311.46	Florins. 76.82	Florins. 12.40	Florins. 106.50	Florins. 509.18	(1) 180,000 holes were dug by the villagers, free.
Barcola.....	49.69	{ 68,860 1,550 }	96,200	95	.....	{ 1,190.01 124.02 }	457.40	.....	.....	1,805.43	(2) Two-thirds of the surface is not susceptible to afforesta- tion.
Basovizza.....	32.00	{ 216,615 1,550 }	234,375	176	363	328.80	(*)808.74	.....	76.06	1,286.10	(3) Half of the surface is not susceptible to afforestation.
Cologna.....	2.00	{ 10,450 11,990 }	11,990	.....	84	156.76	53.95	38.95	16.35	266.01	(4) In part sterile.
Contovello.....	20.00	{ 91,600 17,400 }	134,740	.....	1,735	908.80	549.95	232.64	461.85	2,815.54	(5) Very sterile.
Longera.....	7.23	45,000	46,645	.....	1,500	596.44	262.10	268.90	394.10	1,580.93	(6) In part afforested.
Opicina.....	17.18	76,490	82,500	210	1,226	896.32	416.61	65.03	313.61	1,731.92	100 holes cost 1.23 florins to excavate.
Padrich.....	2.00	(*)13,900	13,900	.....	.....	109.15	60.15	96.40	40.35	265.70	The average cost of excavat- ing 100 meters of ditch is 4.15 florins.
Prosecco.....	7.80	(*)20,070	22,050	.....	818	341.75	130.61	229.32	304.21	1,005.88	The average cost of planting 100 plants is 55 soldi.
S. Croce.....	45.00	(*)113,360	116,670	144	1,144	1,118.14	469.77	39.75	92.75	2,155.13	The average cost of sowing 1 chillog is 37 soldi.
Trebbich.....	19.60	(*)47,930	55,330	50	213	702.61	335.42	29.32	16.75	1,151.20	The cost of erecting 1 meter of dirted wall is 30 soldi.
	{ 197.06 3.00 }	{ 719,875 18,950 }	832,680	725	7,438	{ 6,660.24 786.32 }	3,623.51	999.70	268.75	2,174.50	
Banne.....	.....	.....	3,100	.....	.....	.....	20.00	.....	.....	20.00	
Barcola.....	.....	.....	68,940	235	.....	.....	372.74	.....	62.80	436.54	
Basovizza.....	.....	.....	39,950	100	.....	.....	179.58	.....	10.00	189.58	
Cologna.....	.....	.....	5,350	.....	.....	.....	27.01	.....	.....	27.01	
Contovello.....	.....	.....	27,460	100	.....	.....	138.21	.....	19.15	173.16	
Longera.....	.....	.....	10,800	.....	.....	.....	82.37	.....	15.80	82.37	
Opicina.....	.....	.....	25,615	.....	.....	.....	125.18	.....	.....	125.18	
Prosecco.....	.....	.....	9,730	.....	.....	.....	55.55	.....	35.00	55.55	
S. Croce.....	.....	.....	47,900	160	.....	.....	306.02	.....	.....	341.02	
Trebbich.....	.....	.....	22,240	.....	.....	.....	115.12	33.60	.....	148.72	
	.....	.....	261,085	595	.....	.....	1,422.78	33.60	126.95	1,599.13	
	200.06	{ 719,875 18,950 }	1,093,765	1,390	7,438	7,446.56	5,046.29	1,033.30	395.70	16,112.15	
	.....	.....	61,060	385	.....	.....	365.30	.....	55.05	424.35	
	200.06	{ 719,875 18,950 }	1,154,825	1,705	7,438	7,446.56	5,411.58	1,033.30	450.75	16,536.50	

(1) 180,000 holes were dug by the villagers, free.
 (2) Two-thirds of the surface is not susceptible to afforestation.
 (3) Half of the surface is not susceptible to afforestation.
 (4) In part sterile.
 (5) Very sterile.
 (6) In part afforested.
 100 holes cost 1.23 florins to excavate.
 The average cost of excavating 100 meters of ditch is 4.15 florins.
 The average cost of planting 100 plants is 55 soldi.
 The average cost of sowing 1 chilog is 37 soldi.
 The cost of erecting 1 meter of dried wall is 30 soldi.

In the Austrian forest statistics (as shown in table No. 1) the important distinction is made between those of deciduous trees, principally oaks and beeches, and those of the coniferous, such as pines, firs and larches.

Forests communal (or in common) are found in all the provinces, and may be divided into two classes, which I distinguish as class *a* and *b*.

(*a.*) These are under the care of foresters who administer them for the benefit of the treasuries of the communes to which they belong. No person is allowed to cut wood at pleasure, but each member of the community can purchase, at prices fixed by the communal council, whatever his necessities require, the prices being regulated by the expenses of administration, and by any costs incurred by the community—for instance, in delivering to an applicant timber for building in the village. In such a case the price includes cutting, shaping, and transportation. Rights of pasturage and of gathering decaying foliage—of great value here for compost—are reserved to members of the commune, and a moderate tax is collected for their enjoyment. The annual income from these forests is small, as a rule devoted to their administration, to their preservation by new planting of trees, and to the improvement of the public highways.

(*b.*) Communal forests, in which the members of the commune were formerly allowed to cut fuel and timber for domestic uses, to gather the decaying foliage and to pasture their cattle. Here again there was a distinction between those for which such privileges were moderately taxed and those which were free. Of course abuses of these rights prevailed, there being no forest officials to guard the communal interests, and the state has been compelled to interfere and place such forests in charge of the public authorities. They are now subject to stringent but indispensable regulations for the benefit of the communes.

The annual cuttings are limited to mature or defective trees, the times for felling are fixed, the mode prescribed, and in the transportation it is provided that no damage shall be done to young trees or plants. Under suitable penalties no gathering of decaying foliage on any one locality is allowed oftener than once in three years, and pasturage is forbidden where young plants can be damaged by the animals. The communes are required to appoint and remunerate foresters, whose duty is made not only to guard the forests from the encroachments of persons who have no rights in them, but also from abuses and infractions of the law by those who have.

Sad experience has taught the necessity of the greatest stringency in the forest laws in the mountain districts, and there is a class of communal forests there that are placed under the exclusive control of the state officials. The subdivisions of this class are:

1. Those on the tops of mountains. These, with their decaying foliage, retain the snows and rains, thus diminishing the force of the spring torrents, lessening the damage of inundations below and giving supplies to the sources of springs.

2. Those on steep declivities. These are most carefully cherished not only for the above reason, but as the only security against landslides, which have

in times past caused desolation in many a lovely valley. In fact it is but a few years since railway communication between Trieste and Vienna was for several days interrupted near Steinbrück from this cause.

3. Those on the borders of rivers. The immense fall of the Isonzo, Save, Drave and Murr, with their branches from their sources in the Alps to the plains, gives them a rapidity and force that the strongest and best barriers of stone-work, constructed by the ablest engineers, can hardly withstand, and the fields and meadows through which they rush are every spring in danger of being washed away. Whenever a communal forest borders on these rivers its maintenance is held to be of especial importance. In all these forests, therefore, not a tree can be felled without the consent of the state foresters. No animals are allowed to pasture, and the greatest precautions are taken to guard against fire.

In the provinces within the limits of this consular district are the following named forest departments, each with its own bureau: (1) Trieste, Gorizia, and Istria; (2) Carniola; (3) Carinthia; (4) South Tyrol; (5) Dalmatia.

As the bureaus have the same organization, to describe one is to describe all:

1. At the head of this department and residing in Trieste is Hermann Ritter von Guttenberg. He is "imperial-royal-state-forest-inspector," "forest councilor" in the council of the governor of the three united provinces, Trieste, Gorizia, and Istria, and "head-forestmaster." Perhaps he has other equally expressive titles, but these are doubtless sufficient.

The salaries attached to the offices vary in different departments from 3,000 to 4,000 florins. Of course, he has the general direction of all matters pertaining to the forests throughout his district. By him all general orders are issued, and to him all reports are made; in short, he is responsible for the entire administration of the forest laws.

2. The department is divided into districts, containing from 2,000 to 6,000 hectares of forest each, according to circumstances. At the head of each district is a "forestmaster," or inspector, with salary from 2,000 to 4,000 florins, free quarters and fuel, and from 300 to 500 florins for traveling expenses. Their duties are the general superintendence over the full execution of the forest laws and regulations.

3. The districts are subdivided into what may be called "ranges," each under the charge of a "head-forester" (*oberforster*) or a "forester," with annual salaries ranging for the first from 1,100 to 1,300 florins and for the second from 900 to 1,000 florins. They superintend the felling, planting, delivery of wood and lumber, and control the subordinate employés, rangers, guards, &c.

All these officials have studied forestry scientifically and passed an examination at the *forstchule* at Vienna.

Forestry is their profession, and the possibility of rising in position and emolument is a constant incentive to an active and faithful performance of duty.

Two or three lawyers of reputation are attached to each bureau to take cognizance of the many legal questions that arise between the forest function-

aries and the people, and so many civil engineers as are necessary for surveys, for the selection of trees to be felled, and other like services.

To the local branches of the central government is attached a duly qualified "forest commissary" to guard against neglect or infractions of the forest laws and ordinances by communes and private owners.

4. The revenues derived from the state forests are variable, depending upon position as to market, accessibility, cost of maintenance, protection, and other obvious circumstances. Near Vienna they may be estimated at 15 to 25 florins per hectare; on the contrary, in the Alps there are large tracts of forests where the cost of transportation renders the timber as such valueless, and yet, covering the mountain sources of the great rivers, repay a hundred-fold the expenses of their protection for reasons before given. The forests of Gorizia yield about 15 and Styria, Carinthia, and the Tyrol about 5 florins per annum net income per hectare.

Minute statistics of expense and income generally cannot be given, but are easily estimated in favorable cases. For instance, take the deciduous forests (mainly beech and oak) in the province of Gorizia, which have easy access to and are supplied with water power to saw and shape for the market. A hectare there will produce in a century 450 cubic meters of solid wood, *i. e.*, 4.5 meters per annum; two-thirds of this is fuel and one-third lumber or timber, the value being 30 florins.

The aggregate of expenses, viz: administration, protection, taxes, felling, preparing for the market, and transportation, is to be calculated on the average at 50 per centum; the net income per hectare, therefore, is 15 florins.

5. The planting, or rather the renewal, of deciduous forests in positions where there can be little or no profit is simply left to nature, where fallen and decayed trees are replaced by natural seeding, or from shoots springing from stumps and roots which are sheltered and protected from sun and storm by old growth.

Experience has long since demonstrated that under the physical and climatic condition of this part of the empire, after a forest has been felled, seeding is not a reliable mode of renewing it except here and there in case of the oak, chestnut and the beech; and there is even then more dependence placed upon protecting shoots from old roots than from planting acorns or nuts. When forests of hardwoods are to be planted where other species had before stood, seeding is now generally abandoned and young plants from nurseries, one, two, or three years old, are transplanted.

The age of the young trees selected depends upon the character of their new *habitat* in respect to moisture, exposure to the sun, and to the prevailing strong winds, depths of soil, &c. The planting is in shallow trenches two to three meters apart, and the plants are placed, according to species, at intervals of one to one and a half meters. Thus a hectare receives from 5,000 to 10,000 plants, according to the species. The cost varies exceedingly, being as low as 35 florins in very favorable positions, and as high as 100 florins in others. Nurseries differ in no respect from those in the United

States, except, perhaps, in expense, the cost of a thousand plants two years old in the state nurseries being but from 1 to 2 florins.

Coniferous forests are renewed altogether from the nurseries, and much of the above applies especially to them.

In the schools of forestry the students, under competent instructors, prepare themselves for examination in—

1. Mathematics to the extent required for surveying and measurement, calculation of income and profit of the annual products of the forests.
2. Technical computation as to cost of felling and preparing for the market timber and fuel, charcoal, tar, resin, transportation, the utilizing of bark, valuable leaves, sumac, &c., also the comparative profits.
3. Forest economy, embracing such topics as felling, pasturage, &c.
4. Establishing, renewing and preserving forests.
5. Botany, so far as relates to forests and zoölogy so far as relates to wild animals and game generally.
6. Elements of chemistry.
7. Geology and mineralogy so far as they apply to forestry. If after a three years' course in these studies in the gymnasium and schools of technology, the student passes his examinations with success, he can proceed to the study of forest law at Vienna in a department of the university organized for this purpose.

These theoretical studies are supplemented by one or two years of service in some provincial bureau, and the applicant must pass another rigorous examination before he is admitted into the "profession," so to speak, and begins his career as a public official.

6. The declivities of the Austrian mountains are in general so steep that when denuded of trees there is rarely any hope of reafforestation, for the effects of the sun, frost, melting snows, and rains are too rapid and powerful upon the scanty soil to permit young trees to obtain sufficient strength to bind the earth and secure a footing. Forest fires—happily rare here—and indiscriminate, unlimited felling are equally destructive in such positions. The soil is washed away, landslides occur and carry desolation into the valleys below. In Dalmatia the renewal of a forest is an exception rather than a rule.

7. The Austrian shores of the Adriatic are, in general, bold, abrupt and precipitous; almost free from dunes, and therefore offer little on the subject. Dunes are found in Hungary, and are ambushed by planting trees, such as *robinie* and *pinosylvestre*.

The sandy ground near the sea in the Austrian-litoral (near Grado) is planted with the German *tamarix*, *pinus pinaster sol.* and *pinus ginia l.*

HENRY W. GILBERT,

Consul.

UNITED STATES CONSULATE,

TRIESTE, May 7, 1887.

BOHEMIA.

REPORT OF CONSUL JONAS.

AREA OF FORESTS.

Bohemia, in spite of its dense population, belongs to the well-wooded portions of Europe. There are 1,474,518 hectares under forest, the whole surface of the country measuring 5,195,426 hectares (1 hectare being equal to about $2\frac{1}{2}$ acres), consequently 28.4 per cent. of the entire area of Bohemia is covered with forests. The percentage of the wooded surface in the whole Austro-Hungarian monarchy does not vary much from that of Bohemia, being 29.8; this percentage in Europe is only exceeded by Russia, including Poland and Finland, and by Sweden. All the other European countries fall below the Austrian average, Great Britain having the lowest percentage of forests, namely, 4 per cent. of the whole area.

The question has recently been raised and discussed whether the area under forests in Bohemia has been increasing or decreasing within the last century. A comparison of the old statements as to the wooded area, with recent surveys, would show an apparent increase, but reliable official surveys only date back to the year 1850. From these it appears beyond question that, in consequence of the progress of agriculture and the more varied uses of the soil, and of the increased demand for lumber, the forest area has been decreasing in Bohemia the same as in other European countries. It has been ascertained that in the twenty-five years from 1850 to 1875 there was an actual decrease of 33,212 hectares, which is equal to about 120 square miles (sections), or 2.20 per cent. of the entire area under forests. This loss is not inconsiderable, occurring during a period when forest culture had reached a high degree of development and the importance of the preservation of forests had been generally recognized. It is to be observed that there was a decrease of the forests owned by small proprietors (8.74 per cent. of the whole area) and by corporations (2.48 per cent.), whereas the large domains show in the same period a slight increase.

NATURE OF THE FORESTS.

According to their nature, the Bohemian forests present the following division:

	Hectares.	Percentage.
Pine forests.....	1,205,530	81.7
Leaved or hard forests	89,731	6.1
Mixed forests.....	179,257	12.2

The compact or large bodies of forest land contain 1,160,183 hectares of the whole wooded area; the small or detached parcels 314,355 hectares.

Of coniferous trees the prevailing species are the spruce-fir, the pine, and the larch. The spruce predominates, covering in most parts of the country over 50 per cent. of the forest area, and in the mountains fully 80 per cent.

Of deciduous trees the prevailing species are the beech, the oak, and the birch, together about 87 per cent. of the whole; the alder, the chestnut, the elm, the poplar, the maple, the aspen, and basswood divide the rest among themselves.

OWNERSHIP.

The forests of Bohemia are officially classified, according to ownership, as follows: Forests belonging to large domains, 920,458 hectares; small proprietors, 277,810 hectares; common and corporate forests, 276,250 hectares.

The category of large domains embraces all estates of entail and in fief or feudal estates, and all such allodial estates as contain over 115 hectares.

The category of small proprietors includes allodial estates whose area is less than 115 hectares.

In the category of common and corporate forests are included those forests which are the property of communes and of the church, and also such as belong to schools, endowments and foundations. Of this class of forest about 70,000 hectares belong to churches, convents, and bishoprics; whereas schools hold only 1,148 hectares; different endowments, 29,273 hectares, and the rest belongs to communes.

There are no forests in Bohemia owned by the state, excepting the domain of Joachimsthal, with an area of 5,470 hectares under forest.

COMMON FORESTS.

In some parts of Bohemia the common forests were devastated in former years through bad economy. No attention was paid to their renewal by cultivation; on the contrary, the ground was used for common pasture, making the natural regeneration of the forest through seeding an impossibility. Recently, by order of the government, forest culture upon such devastated areas has again made a start, and they are subject to the supervision of the imperial authorities, while the forest bureaus of adjacent large domains have taken voluntary charge of the management of such forest cultivation.

Common forests cover an area of a little over 180,000 hectares. The city of Pisek stands at the head of the communes possessing forests, being the owner of 5,763 hectares of forest land in good condition. Bergreichenstein comes next with 4,700 hectares; Pilsen, Elbogen and Joachimsthal hold over 3,000 hectares each. Other communes have less than that amount of forest land.

The population enjoys only very limited privileges in common forests. On certain days, usually twice a week, the poor are allowed to gather scrawls and dry branches lying on the ground, but they must not break any twigs or branches or use carts or any kind of vehicle for the purpose. For this slight privilege they are frequently required to help in the spring about a week in the work of forest planting without pay. The picking of mushrooms in forests is generally tolerated, but the raking of leaves for litter is not permitted, they being left to rot in the woods and serve as manure.

Pasture is not allowed except to the forestkeepers, and then only in places where no injury can be done to forest culture. Since the abolition of the right of common usage pasture is also generally disallowed in the woods of private domains. Except in hardwoods pasture has never been of much import, there being a great scarcity of grass in coniferous groves.

Citizens who own buildings, to which a vested interest in the common property attaches, receive yearly a certain amount of fuel, as well as the timber necessary for the repair or rebuilding of their homes, and the owners of buildings of a later origin, to which no such vested interest attaches, usually receive more or less fuel at a moderate price. The poor are furnished a certain quantity of fuel from the common forests without pay.

ORGANIZATION AND FUNCTIONS OF GOVERNMENT FOREST BUREAUS.

The administrative or political officers of the government are charged with the supervision of the affairs and general interests of forest culture.

The ministry, or department of agriculture, is the highest authority in matters relating to forests. It has the supreme control of the enforcement of forest laws, of the schools of forestry, of the management of government forests in the whole empire, and is a board of appeal in administrative cases.

In Bohemia the highest authority in forest matters under the ministry of agriculture is the *statthalter*, or governor, whereas the *bezirkshauptmann*, or district captain, is the authority of the first instance.

The district captain is charged with the enforcement of laws generally, and in matters of forestry his particular functions are as follows:

1. To uphold the existing rules and regulations, and to carry out the decrees of the higher authorities.
2. To decide in all cases which are not reserved for the action of the higher authorities and of the courts.
3. To supervise all sluices, wooden grates, booms, &c.
4. To carry out all police regulations bearing upon forests.
5. To take the initiative in all measures necessary in cases of forest fires and of other calamities; to help the sufferers to prosecute offenders, &c.
6. To adjudicate all differences between forest managers and their subordinates or hired men, if they are brought to their knowledge during the time in which the relation of master and servant exists, or at least thirty days after its termination. Later on such disputes must go before the district courts.

To aid the political authorities in matters of forestry special forest bureaus have in recent years been created.

1. The *forstinspector* (inspector of forests), subordinate to the governor. He is charged with the general inspection of forests and carrying out of the law in the whole kingdom. He is bound to give advice and render assistance to the governor and the subordinate political authorities in matters of forest culture. He makes tours of inspection, of which the local authorities and the owners of forests are notified in advance, and he reports to the governor the results of his observations.

The inspector of forests is authorized to make representations to the governor, and also to subordinate political authorities, concerning measures which, in his opinion, are necessary in the interest of forest culture, and which lie within the province of those authorities. By direction of the governor he inspects the action of the subordinate bureaus in matters of forestry.

It is the duty of the inspector of forests to prompt the communal authorities, the forest culture societies, and the managers and owners of forests to take measures which he deems necessary for the security and promotion of forest culture, particularly a well-regulated forest economy, the founding of nurseries and production of seed, &c.

He is authorized to correspond officially with all officers and organs of the public administration, as well as with proprietors of forests and their employés, to submit questions to them, demand reports and opinions, also to ask their active support in his official duties. Such correspondence is always subject to the inspection of the governor.

The inspector of forests is bound to visit at least once a year the offices of the forest commissioners for the purpose of examining their official actions and pointing out defects and oversights. He has to promote instruction in forest culture and the general spread of its principles, also to collect and arrange the materials for general forest statistics, showing the actual state of forest culture, the changes which are taking place, the annual yield of forests, the consumption of wood and timber, &c. He directs and inspects the seed and tree nurseries founded or maintained at public expense.

2. The *forstcommissäre* (forest commissioners). This office was created only a few years ago, in order to subdivide the supervision and to assist the inspector of forests. There are six commissioners in Bohemia; one is attached to the inspector of forests and the others are stationed at the following places: Pilsen, Karolinenthal, Komotau, Trautenau, and Deutschbrod. Accordingly, the country is divided into five circuits, and the power of each forest commissioner is co-extensive with his circuit. In matters concerning official functions and discipline the forest commissioner is directly subordinated to the captain of the district in which he resides; but he must be at the service of every district captain within his circuit.

The functions of the forest commissioners are on the whole similar to those of the inspector of forests, and they are thus specified in the general law:

1. To support the political authorities in the state supervision of forests and in the enforcement of the laws and ordinances concerning forestry, especially through their advice as experts, through a continued observation of the condition of forests, and by means of giving notice of all detected contraventions of the law.

2. To promote forest culture by means of giving instruction and hints to such owners of forests as appear to be in need of them, and through the encouragement of measures calculated to improve the condition of forestry.

3. To take charge of the actual management of common and other forests in certain cases, with the consent of the ministry of agriculture, when it can be done without neglect of their proper duties.

4. To fulfil such obligations as may be imposed upon them by special laws or regulations.

5. They may be commissioned by the political authorities to make independent local investigations in matters relating to their functions.

Under this law detailed instructions are issued by which the actions of the forest commissioners are governed.

SUBSIDIARY ORGANS.

1. In 1873 a provincial board of agriculture (*landesculterath*) was created for the promotion of the interests of agriculture, and a section thereof is devoted to forestry. This section has already rendered some material services to forest culture in Bohemia. It has promoted the establishment of district nurseries of forest trees, twenty-three of which are in the enjoyment of subsidies and three are entirely in charge of the board of agriculture. Seeds and seedlings are annually distributed to small proprietors of forests and to communes, on the average about four millions of young trees and 400 kilograms of seed. Courses of lectures on forestry have been provided and held in different parts of the country at the expense of the board.

The board of agriculture is authorized to submit to the government drafts of laws bearing on forestry, and to transmit petitions touching the same subject. In its memorial of January 31, 1885, it declared in favor of import duties on timber, which proposition, however, did not prevail. The board encourages the planting of bare hillsides and mountains with forest trees; also the culture of willows for the use of basket factories, for which purpose also a large number of young plants is yearly distributed among the agricultural societies in the country.

2. The association of Bohemian foresters (*der Boehmische forstverein*) was organized thirty-eight years ago, and has contributed its share toward the promotion of forest culture. The seat of the association is at Prague, but its annual meetings are held at different places, and connected with excursions into forests. The reports of the meetings and excursions are printed in the periodical publication of the association, which appears bi-monthly, in pamphlet form, in the German and Bohemian languages.

The association submits opinions and propositions in matters of forestry to the authorities, and participates by invitation in the appointment of the state commission for examinations in forestry, which takes place once a year. It initiated in 1875 the practice of distributing forest seed and seedlings to small proprietors and poor communes, for which purpose the large domains have annually made, through the efforts of the association, large contributions.

The association has over 1,700 members, and a yearly budget of about 20,000 florins.

The whole area of government domains in Austria is 1,037,470 hectares, divided as follows:

	Hectares.
Forest lands	669,218
Agricultural lands	61,921
Unproductive lands	306,331

The control of these domains is divided among seven directories (*directionen*). The subdivision for the purposes of management and protection comprises 19 inspection districts (*inspections-bezirke*), 178 management districts (*verwaltungs-bezirke*), 714 protection districts (*schutz-bezirke*).

In Bohemia there is no "directory" of government domains, their extent being, as before stated, very small, namely, 5,919.5 hectares of land, the management of which stands under the direct control of the ministry of agriculture.

1. Every manager, called *forster* or *oberforster* (forester, chief forester), has a defined district or riding intrusted to his independent management, subject, however, to definite rules and instructions. He has an assistant (*forstgehilfe*), whose appointment is temporary.

Every manager has the requisite number of forest keepers or wood-wards (*forstwerte*) with a permanent tenure of office, and entitled to pension as other government officials. Their principal duty is the protection of the forests against trespass and damage. Their functions are minutely laid down in the service regulations.

In case of necessity temporary overseers of forests are appointed in addition to the permanent officers.

The financial branch of the management is in charge of the bureau of accounts of the respective domain.

2. The supreme management is vested in the ministry of agriculture, which for that purpose has a department of technical forestry. This is composed of the chief forester (*oberlandforstmeister*), two forest councillors (*forsträthe*), and the necessary number of expert assistants regularly educated in technical forestry.

The main functions of the department of technical forestry are as follows:

1. The revision of all arrangements concerning the management of forests.
2. The organization of the service and laying down of instructions.
3. The continuous control of the technical treatment of the forests; the examination of periodic schemes, and of the scale of prices of the products.
4. The regulation of wages; assistance in negotiations for the sale of products, &c.
5. The control and supervision of the doings of all subordinate forest officers; inquiry into their qualifications; recommendations for appointment and promotion, which are made by the chief of the technical department in a mixed committee presided over by the minister.

COSTS AND PROFITS OF FOREST CULTIVATION.

The felling period of pine forests on large domains is 80 and 100 years; elsewhere it is lowered to 70 and 60 years. Leaved forests in small parcels are felled in 20 to 30 years.

Some thirty years ago Dr. Stamm made a general statistical investigation into the costs and profits of forest culture in Bohemia. He found the total annual yield of the forest lands to be 16,826,000 florins.

The cost of production was estimated at 30 per cent. of the total value of the product, so that there appeared to be a profit of 11,788,200 florins. The so-called side-gains, or collateral profits, derived from the forests, such as bark of oak and pine, grass and litter, were estimated at nearly four million florins.

The following is a recent estimate of the annual yield of the Bohemian forests:

	Florins.
Timber	10,000,000
Fuel	6,000,000
Stump-wood	600,000
Bark and litter	600,000
Total	17,200,000

The collateral profits being estimated at 4,000,000 florins the gross yield of forest culture appears to be 21,200,000 florins.

The expenses of management and production being set down at 35 per cent. of the gross yield, there is a clear annual profit of 13,780,000 florins, or 9.14 florins to the hectare of forest land on the average, equal to \$3.40, or \$1.36 per acre in American values.

This average rather falls short of the reality, as the profits of small forests are greater, and the expenses of their management insignificant; but it represents fairly the profits of the forests of large domains, inclusive of the remnants of government forests, as will be apparent from the subjoined authentic statement.

The city of Pisek, holding and managing, as above stated, 5,763 hectares of forest, furnishes at my request the following official exhibit of the annual expenses and profits of its forest lands:

Expenses:

	Florins.
Salaries and wages of employés, pensions, and commissions.....	22,000
Taxes	7,700
Equivalents	1,500
Wages of wood-cutters.....	9,000
Forest culture.....	1,600
Building and repair of roads.....	2,000
Repair of buildings.....	1,500
Sundry expenses	3,000
Total.....	48,300

Receipts:

	Florins.
Wood and timber, main yield of 19,000 cubic meters.....	91,000
Wood and timber, collateral produce of 2,000 cubic meters.....	8,000
Other products.....	8,000
Total.....	107,000
Annual clear profit.....	58,700

This result is obtained chiefly from the clearing of from forty-nine to fifty-two hectares of forest per year. It shows the clear average profit from one hectare of forest land to be a trifle over 10 florins, which agrees well with the above estimate of average profit for the whole country.

As for the government forests in Bohemia the annual average for a period of five years is the following:

	Florins.	Florins per hectare.
Gross receipts	91,579.89½	or 15.50
Expense of management	54,730.00	or 9.25
Clear profit	36,849.89½	or 6.25

There are three domains held in trust and managed by the government for different funds, namely:

	Hectares.
Ronov, scholarship fund.....	2,181
Gratlitz-Katus, hospital fund.....	948
Tuchomeric, university fund.....	459
Total.....	3,588

Each of these domains has its own forest bureau, independent in matters of forestry and under direct government control in matters of administration. The forests are subdivided into seven districts (*reviere*), each managed by a forester or ranger, and, further, into seventeen protection precincts or wards, with as many forest-guards.

The financial result of the management of these forests, taking the annual average of ten years, is shown by the subjoined table, furnished by the government authorities at my request:

	Florins.	Florins per hectare.
Gross proceeds.....	63,998	or 17.83
Cost of management.....	30,498	or 8.50
Net profits of the forest.....	33,500	or 9.33

The expense of forest culture proper is, on the average, 25 florins per hectare of cultivated forest, or 0.45 florins per hectare of the whole area under forest, per annum. The prevailing method of cultivation is by planting.

In the different sections of Bohemia the expense of forest planting ranges from 20 to 40 florins per hectare; but the cost stated in reference to government forests, namely, 25 florins per hectare, may be considered a fair average. It is equal to about 10 florins, or \$3.80 per acre. Both men and women are usually employed at this labor at very low wages; that is, 30 to 75 kreutzers for men and 30 to 50 kreutzers for women, 2½ kreutzers being about equal to 1 cent. The wages of wood-cutters are equally low, namely, 30 to 60 kreutzers for a cubic meter of wood or a solid meter of lumber, according to agreement, a cubic meter being equal to 1.3 cubic yards.

There is, on an average, for 2,000 hectares of forest 1 hectare of nursery; and the yearly cost of its maintenance ranges from 150 to 300 florins.

The number of persons employed in forest culture in Bohemia, and having enjoyed a professional education, is the following:

Managing foresters.....	459
Officers in forest bureaus.....	529
Rangers	1,954
Assistants	950
Total.....	3,892

There are besides 5,915 forest-guards, making the whole force of employes in that branch 9,807, or one to every 150 hectares, or 375 acres, of forest land.

METHOD OF FOREST PLANTING AND CULTURE.

Forest culture and management in Bohemia has reached a high degree of perfection. The whole forest economy is based upon systematic calculations, which, in the large domains, are generally intrusted to a separate bureau. The forests are mapped and classified according to age, character, and amount of stumpage, and divided into "cuts" or "turns" for the purpose of felling. The annual extent of felling is fixed upon the basis of a calculation, by which the annual increase of timber and the area of forest reaching its maturity is ascertained. This is done usually for a period of ten years, and then revised and corrected according to experience.

The amount annually maturing is called the main produce, and is cut either by clearing or gradual felling. Upon the method of cutting depends the culture or propagation of forests.

1. *Natural renewal or propagation.*—After clearing, the forest is renewed by seeding or planting. Where the gradual felling obtains, the forest renews itself by self-seeding, which is supported by the scattered felling, until finally the young forest emerges completely from the shadow of the old growth, which disappears. The method of gradual felling obtains in mountainous districts, where the beech and the fir are prevalent, which thrive best in the shadow of parental trees.

This method offers the great advantage of saving almost the whole expense connected with the artificial planting of forests. At the same time the ground is never deprived of shade, which preserves its productive force much better than the system of clearing. From these considerations many foresters advocate the method of gradual felling as the only rational one, rejecting the method of clearing altogether. A young forest always thrives much better if protected by a high growth at least on one side; and it is found expedient, where the system of clearing prevails, to clear the outskirts of the forest in long, narrow strips, so as to secure to the young growth some protection against heat and wind.

2. Forest seeding, in connection with clearing, is done either broadcast or in drills, or in the so-called "dishes." Broadcast sowing requires the greatest amount of seed, sowing in dishes the smallest amount.

This method is not expensive, because tree-seed, especially of spruce, is cheap. The quantity of seed required to a hectare is from 6 to 10 kilograms.

Neither does it call for much labor, as the soil is only moderately loosened by hoeing. The entire cost of manual labor is from 6 to 12 florins per hectare. Large areas of forest can be sown in a very short time.

But, notwithstanding all these apparent advantages, this method is steadily on the decrease. The result of seeding is very uncertain, depending too much upon the elements. Rainstorms, drought, and frost have a damaging effect. In case of overseeding to growth becomes dense and does not thrive. For these reasons sowing is resorted to only in rare cases, to grow pine and oak.

3. Planting is the method now prevailing. The seedlings are raised in nurseries, usually made in clearings with a good soil. Level or slightly sloping ground is selected, so that rainstorms cannot damage the nursery or cause washouts. The ground is hoed to the depth of 20 to 30 centimeters, and generally prepared as in gardening. Beds are made in which the seed is then thinly covered with soil. The beds are covered with moss or brushwood for protection against heat and birds, which protection is removed when the seed begins to sprout.

The seedlings of coniferous trees are left in the nurseries from two to four years. When thick, they are thinned out and care is taken to keep the ground clear from grass and weeds. Where the climate or rich grassiness of the soil requires the seedlings to be four or five years old, they must be raised in nurseries and replanted when they are two years old. This method greatly enhances the cost of raising seedlings, and it is carried out only in case of pressing necessity.

Within the last fifty years the raising of seedlings in nurseries has become prevalent in Bohemia. The young trees from the nurseries are planted in holes or in hills. Planting in hills obtains only on wet ground, or in poor, shallow soil. The trees are planted in rows from 1 to 1½ meters apart, or in squares at the same distance, and from five to eight thousand young trees are needed to the hectare. In hill-planting the hills are covered up with sod or stones, to prevent their drying up. When trees are planted in holes upon poor ground, sod is placed under the roots to furnish better nutriment to the seedlings.

After planting the forest does not need much care. The tall-growing weeds are sometimes cut down in the first summer; the places where the plants have miscarried are filled with fresh ones, and the young forest is cleaned from undesirable trees and shrubs, which find room to sprout and grow among the seedlings of the plantation. Afterward, in periods of five to ten years, the growing forest requires thinning, which not only pays for itself but is a source of considerable profit.

SCHOOLS OF FORESTRY.

There is in Bohemia an independent school of forestry at Weisswasser, and a school of forestry connected with the agricultural college at Pisek.

The school at Weisswasser was founded in 1856 by the association of Bohemian foresters, and in 1862 it became the property of a forest school

association for Bohemia, composed of large owners of forests. This association has charge of the administrative and financial management of the institution; the scientific management is carried on by a director. The school has the following corps of teachers: Two professors of forest culture sciences; one assistant professor of forest culture sciences; two professors of natural sciences; one professor of the mathematics and geodetic branches connected with forestry.

For admission into the school at Weisswasser the following conditions are prescribed: (1) Graduation from the lower real school of three years, or the lower gymnasium of four years; (2) one year's apprenticeship with a forester authorized to receive apprentices.

The school is divided into two annual courses, each consisting of two "semesters." The first semester begins on the 15th of October and ends a week before Easter; the second runs from Saturday after Easter until the last of August. The number of students is limited to forty in each annual course.

The full curriculum of instruction comprises the following subjects:

1. Mathematical sciences:
 - a.* Arithmetic, algebra, geometry, trigonometry, stereometry.
 - b.* Architectural and geometrical drawing.
 - c.* Practical surveying.
 - d.* Forest architecture.
 - e.* Forest mathematics.
2. Natural sciences:
 - a.* Physics, meteorology.
 - b.* Inorganic and organic chemistry.
 - c.* Geognosy; mineralogy in connection with the knowledge of the soil.
 - d.* Botany—general and special—applicable to forests; physiology of plants.
 - e.* Zoölogy, general entomology and special entomology with reference to forests.
3. Subjects of forestry:
 - a.* Protection of forests.
 - b.* Exposition of the Austrian law on forestry.
 - c.* Forest culture.
 - d.* The uses and the technology of forests.
 - e.* Forest arrangements, taxation and regulation of the yield.
 - f.* Forest economy.
 - g.* Art and science of the chase.
4. Outlines of national economy.
5. Business style.

The theoretical instruction is supported by practical lessons and excursions. These are particularly—

- a.* Exercises in surveying.
- b.* Excursions bearing on natural science.
- c.* Excursions bearing on forestry.
- d.* Practical problems in forest culture and taxation.

With the pupils of the second year, before their graduation, an extended excursion is undertaken into regions of special interest to the forester. Examinations take place at the end of every semester, and at the close of the second annual course the pupils have to undergo a general or graduating examination.

For the purposes of practical instruction the school has at its disposition : One school forest with an area of 1,171 hectares, and several nurseries with an area of 7,600 square meters.

They are managed, under the control of the director of the school, by the second professor of forest sciences, assisted by one forester, one assistant forester, one deputy assistant, and two forest guards.

There is also a hunting ground at the disposition of the school for practical lessons in hunting. This hunting ground has an area of 1,929 hectares of forest, including the school forest, and 669 hectares of open field, together, 2,598 hectares of ground.

For practical object lessons the institution also possesses extensive collections in all branches of instruction.

At the school of forestry in Pisek the number of pupils is limited to thirty in each of the two annual courses. The same preparation for admission is required, except the apprenticeship, and, moreover, a physician's certificate of fitness for service in forestry.

The aim of the school is to educate subordinate employés in forestry, and the grade of scientific studies is not so high as at Weisswasser. The curriculum comprises :

1. Arithmetic, geometry.
2. Drawing.
3. Natural history, meteorology, chemistry.
4. Theory of the nourishment of plants.
5. Knowledge of the soil and special forest botany.
6. Special forest entomology.
7. Forest technology.
8. Theory of forest culture, forest management and production.
9. Theory of the chase.
10. Rudiments of surveying, and of the calculation of quantities.
11. Forest legislation.
12. Bookkeeping, accounting and correspondence.

The pupils receive practical lessons in all the functions of forestry, especially in actual forest culture, the establishment of nurseries and other operations under the direction of the chief forester of the city of Pisek. Frequent excursions are made into near as well as into distant forests, occupying sometimes more than a week.

Examinations are held at the end of every semester, and a graduating examination at the close of the second annual course.

DESTRUCTION OF FORESTS.

In the following the principal causes of the destruction of forests are briefly reviewed :

1. *The elements.*—Storms have from time to time caused an extensive destruction of forests in Bohemia. The damage through windfalls and snow pressure was exceptionally great in the years 1868 and 1870, mostly in the Boehmerwald region, a mountain range about 150 miles in length, forming the boundary between Bohemia and Bavaria, with a moderate slope on the

Bohemian side, and covered with forest to the summits. In some of the mountain recesses of the Boehmerwald primeval forests exists to this very day. But almost every year the damage from this cause is considerable. Full statistical tables for 1885 give its extent at more than 600,000 cubic meters of wood, valued at 2,600,000 florins. The area affected was 23,258 hectares.

2. *Insects*.—Of the different species of insects hurtful to forests the common bark-beetle (*bostrychus typographus*) has proved to be the most destructive. The calamity caused by the same in the Boehmerwald is supposed to have had its origin in the heavy windfalls occasioned by the storms of 1868. In the year 1870 there was another visitation of severe storms, causing such extensive windfalls that the ground could not be cleared of the fallen timber, which became a hotbed for the breeding of the insect, so that in the following years it made its appearance in enormous numbers. In the years 1873 and 1874 the calamity reached its culmination. It became necessary for the government to interfere with energy, and to adopt systematic measures to stop the ravages. A central committee was formed, with the governor of Bohemia as chairman, and subordinate committees in the different districts, each composed of three members, with the addition of the necessary number of district managers and forest commissioners as their executive organs. Several meetings were also held with foresters from the neighboring countries of Upper Austria and Bavaria for the mutual exchange of experiences gained in the struggle against the destroyer, and to agree upon a general plan of campaign. An entomologist was sent by the government to the Boehmerwald to investigate the plague and to report the result.

The best means to exterminate the insect is the rapid removal of the affected trees, or the charring of such trees, before the insect matures. But this cannot always be done in time, and the next best proceeding is the stripping of the fallen or felled trees of their bark, which is then burned, before the insect is developed. It has also been shown that the undeveloped beetle cannot stand fresh air, its eggs and larvæ perishing by the mere exposure of the stripped bark. The use of so-called *fang baume* (literally, "catching-trees" or "decoy-trees,") has been resorted to with success. Trees are felled and placed upon supports in sunny spots to catch the swarms of developed insects about to lay their eggs, and they are stripped of their bark when the larvæ of the insects are changing into chrysalides. Such trees must be carefully examined to carry out the stripping process at the right time. In 1874 the windfalls were all worked up before the middle of October, and in the damaged areas the moss was raked in heaps and burned. The heaps were found swarming like ant-hills with the insect.

The first sign of the presence of the bark-beetle is the dull color and loss of luster of the leaves, which afterwards turn red and the tree dies, its inner bark or liber being destroyed.

The whole extent of the destruction caused by the bark-beetle in the years mentioned was 9,012 hectares of forest, containing 3,632,000 solid

meters of wood. Through the concerted action of the authorities and proprietors the ravages were stopped, and since then the beetle appeared only sporadically. The amount spent for the purpose of its extermination in the years 1873-1876 was 1,259,354 florins, and the number of men employed thereat was 9,850. The Bohemian diet appropriated 100,000 florins to create outlets for the fallen and felled affected timber from inaccessible regions.

The pine caterpillar has lately caused some damage in the pine forests, but the authorities have been very prompt in adopting measures for its suppression. The elephant beetle and the larvæ of the maybug are dangerous to the young pine and spruce plantations and the nurseries. The provincial board of Bohemia offers annually bounties for the destruction of the maybug, and the law protects such species of birds as are destructive to the larvæ, especially crows and jackdaws.

3. *Forest fires.*—Extensive forest fires do not occur, and indeed they are impossible in Bohemia. Causing a fire through carelessness is punished with fine and imprisonment. Whoever observes the forest fire is obliged to notify the inmates of the next house he passes, and they are bound to give notice to the chairman of the next village and to the owner of the forest or his officers under penalty of fine and imprisonment. The chairmen of the neighboring villages and the owner of the forest or his officers are authorized to call upon the population to assist in putting out the fire, and all are bound to obey the summons.

LUMBER SUPPLY—TRADE IN LUMBER.

Permission to use water courses for the purpose of floating or rafting timber and to establish booms is granted by the captain of the district; or if the timber passes through several districts by the governor, but only for three years at a time. For a longer period it can only be granted by the ministry of agriculture.

Most of the timber comes from the Boehmerwald; a moderate amount is brought from the mountain regions in the northeast and northwest of Bohemia. The Moldau and the Elbe, with their tributaries, are the main waterways for the supply of timber. To facilitate the movement of timber, artificial reservoirs have been established in the Boehmerwald, collecting water from the rivulets and brooks. Canals have also been built, the principal of which is the Schwarzenberg canal, 51 kilometers long, cutting through several thousand hectares of forest in the domain of Krumau, belonging to Prince Adolf Schwarzenberg. It serves to float timber and wood to Vienna.

The principal lumber market is Prague, situated on the river Moldau, nearly in the center of the country. From there the export of lumber takes place to Dresden, Leipsic, and Magdeburg, in Germany, and a certain quantity of logs is carried down to Hamburg, to be used in ship building. But the export of ship-timber, especially oak, has greatly decreased of late. A good deal of timber is exported on the Elbe river direct to Germany. Since

the enactment of import duties on lumber in Germany in 1879, the export of Bohemian lumber has fallen off; on the other hand, logs are rafted to Germany to be worked up at the German saw-mills. A considerable amount of lumber goes to Austria proper, and to the lumber markets of Southern Germany, especially to Nürnberg and Mayence. Ties used to be made in Bohemia in large quantities, but in consequence of cheap competition from other sources and the very limited construction of new lines of railways their production almost ceased.

The lumber trade of Prague is shown by the subjoined table. These were brought to Prague by the Moldau river, which, by means of its tributaries, draws from all sources of supply in the south and west of Bohemia:

Year.	Logs, in cubic meters.	Lumber in pieces.
1884.....	302,025	1,261,494
1885.....	251,835	1,254,513
1886.....	258,341	1,056,969

Shipped from Prague, mainly to Germany :

Year.	Logs, in cubic meters.	Lumber in pieces.
1884.....	223,519	844,329
1885.....	198,876	940,885
1886.....	220,141	860,840

A certain amount is exported by railway, especially to Southern Germany. The whole export from Bohemia, taking an approximative statement based on the official figures for the whole empire, was in the year 1885 as follows:

	Metrical centners.
Timber, hard.....	125,000
Timber, soft.....	3,370,000
Staves.....	250,000
Ties.....	300,000
Lumber, hard.....	30,000
Lumber, soft.....	1,300,000

A peculiarity of the Bohemian lumber trade is the Moldau toll levied in Prague on all logs and lumber brought down the river, by which the state collects about 60,000 florins a year for the improvement of the river.

The whole annual produce of the Bohemian forests is 3,524,000 cubic meters, or 3.53 cubic meters per hectare, of which aggregate amount 57 per cent. is fuel or cord-wood and 43 per cent. timber.

FOREST LAWS.

There are no provincial or local forest laws in Bohemia, the general forest law of the empire being in force.

On the 30th of April, 1870, a provincial law was promulgated for the protection of agriculture against ravages by caterpillars, maybugs, and other injurious insects. The following is a translation of such of its sections as have a slight bearing on forestry:

SECTION 1. Every holder of a piece of land, whether proprietor or tenant, is obliged before the close of March in every year to clean the fruit and ornamental trees, shrubs, hedges, fences, and walls in his gardens, vineyards, fields, and meadows of involved caterpillars, eggs of insects and larvæ, and to burn or otherwise destroy the gathered nests of caterpillars and eggs.

In the same manner are to be destroyed the caterpillars as soon as they appear in the spring upon trees, shrubs, and cultivated plants, as well as the larvæ, within a time fixed by the chairman of the commune in a public proclamation.

When trees infested with caterpillars are cut down, or branches in such condition lopped off, they must be cleaned of the caterpillars without delay, or burned.

SECTION 3. The persons named in section 1 are equally bound to shake off daily, and especially early in the morning, the maybugs during their swarming period, within the time named by the chairman of the commune, from fruit and ornamental trees, shrubs, and avenue trees; also from trees on the outskirts of forests, in cases where the forests are so near the said trees that the neglect of shaking would make the whole measure nugatory, and to destroy them or use them for agricultural purposes.

RELIABLE SELLERS OF SEEDS AND SHOOTS.

Prince Schwarzenberg's forest bureaus at Frauenberg, Krumau and Winterberg; Domaine Sazava; Rott and Vogel, Prague; V. Samal, Jungbunzlau.

CHARLES JONAS,

Consul.

UNITED STATES CONSULATE,
PRAGUE, *April 14, 1887.*

FRANCE.

NICE.

REPORT OF CONSUL HATHEWAY.

EVEN in the days of Charlemagne, and especially since the sixteenth century, restrictive legislation has prevailed in France, to resist the destruction of its woodlands.

Their physical, economical and hygienic value have thus long been held of serious importance, and successive systems have been constantly adopted and applied for their management, improvement and preservation.

A department of the government for the administration of its forestry laws has its seat at Paris. The area under its jurisdiction in 1874 was computed at 20,641,953 square acres.

A bureau of said department is located at Nice, supervising the divisions of the Maritime Alps and the Var. The first named, within which this consulate is placed, contains of forests of the state 1,310 acres, of forests of the several communities 117,250 acres, and 103,800 of those of private areas.

All varieties of the arboreous vegetation of Europe are to be found in these woodlands, but the olive, beech, larch, pine, fir, ash, oak and cork trees are most conspicuous. The larger tracts are distant from inhabited centers and destitute of roads of communication.

No revenue accrues from the government lands except the sum of \$1,158 annually as the rental of the chase in St. Margaret's Isle.

The director-general at Nice has under his orders, for the district of Alpes Maritimes, two inspectors, two sub-inspectors, four chief foresters and sixty foresters and guards. For the conservation of the forests of Nice itself a special commission is adjoined of two inspectors, one chief forester, one sub-forester and five foresters and guards.

In the forests pertaining to the municipalities such parts as are undergoing culture are placed under defense for the period of ten years, and in all portions capable of enclosure pasturage only is permitted to oxen, cows and horses, and but rarely to sheep. The inhabitants are allowed the fallen wood, but may remove no other product without authorization.

Nearly 49,425 acres, classed as private areas, are exclusively subject to municipal control, and at the period of their annexation to France, in 1860, were adjudged incapable of improvement. These are under no restrictions whatever, either as to felling or pasturage, and under such conditions are becoming gradually more and more denuded, and all growth must thus, in time, disappear.

The primary mode of forest management consists in the cutting away of the older trees, the pruning of dry and decaying branches, and in assisting the natural renewals of growth of shoots and self-sown seedlings. In cutting the maturity of the timber is a condition observed, and then a sufficient number of large trees are spared in spots favorable of soil and exposure to provide for the reproduction of the species. Where young plants too thickly spring these are distributed elsewhere, and as they increase in size, and the shelter of others becomes unrequired, they are again separated by the thinning out of those less promising, and ample space thus given for the spreading boughs. It is considered that oaks attain full girth at about 125 years, firs at 120, beeches at 90 and red pines at 85. Much discretion is of course necessary when the age of the forest is not of record in determining the time to fell. The system of divisional felling at intervals of from fifteen to forty years, according to the softness or hardness of the wood, is frequently adopted whereby the forest is constantly maintained. To illustrate the treatment of brushwood I furnish the following table showing a method projected here over a tract of 120 acres where the growth in 1885 was all about 21 years old, and composed chiefly of ash trees and white pines:

First term.				Second term.			
Number of cuttings.		Years of felling.	Ages of wood.	Number of cuttings.		Years of felling.	Ages of wood.
1.....	10 acres..	1885	21	1.....	10 acres..	1906	21
2.....	10 acres..	1885	21	2.....	10 acres..	1907	22
3.....	10 acres..	1886	22	3.....	10 acres..	1908	22
4.....	10 acres..	1886	22	4.....	10 acres..	1909	23
5.....	10 acres..	1887	23	5.....	10 acres..	1910	23
6.....	10 acres..	1887	23	6.....	10 acres..	1911	24
7.....	10 acres..	1888	24	7.....	10 acres..	1912	24
8.....	10 acres..	1888	24	8.....	10 acres..	1913	25
9.....	10 acres..	1889	25	9.....	10 acres..	1914	25
10.....	10 acres..	1889	25	10.....	10 acres..	1915	26
11.....	10 acres..	1890	26	11.....	10 acres..	1916	26
12.....	10 acres..	1890	26	12.....	10 acres..	1917	27
Total.....		120 acres..		Total.....		120 acres..	

The works for the improvement of the forests include the survey of lands, the construction of roads and bridges, the laying of drains, the opening of ditches, the establishment and care of nurseries, the choice of seeds, and the adaptation and setting of plants and trees.

There is an institute at Nice for instruction in silviculture and forest law.

The conditions of admission to the forest service are as follows: The candidates for the position of guards must belong to the forest districts; must be not less than twenty-three years of age, and may be appointed as vacancies occur after satisfactory examinations. They may be promoted to the rank of general guards after a creditable service of two years. The examinations are divided into two classes, viz., those in the field and those at the

bureau at Nice. In the first the applicants must practically illustrate their knowledge of land surveying, of leveling, of silviculture (including botany), and of all questions pertaining to forest economy in the presence of commissioners appointed by the director-general. In the second examination before the commissioners the candidates, in response to printed questions, previously sealed, are required to reply in writing. The inquiries relate to forest laws and regulations, the calculation of solids, the elementary principles of vegetation, the physiology of woods, the culture of forests and the management of forest affairs. The destruction of forests has chiefly occurred where legal restrictions have not prevailed, and has resulted mostly from their free and indiscriminate cutting by the inhabitants, and from the pasturage of large flocks of sheep and goats, which have exhausted the undergrowth upon which the perpetuation of the woods depend. No sand dunes appear in this district. A large portion of denuded land has been ordered to be replanted as a natural and necessary safeguard against the violence of storms and the damages of inundations.

The forests of this district afford annually about 2,600 cubic meters of construction timber. Very little of this, however, reaches the market of Nice. The difficulty and cost of transportation from the mountains over insufficient roads is so excessive that the lumber of foreign countries can be landed and sold at this center at a cheaper price. Lumber coming direct to this port from the United States is subject to no duty; but arriving indirectly via some European point pays \$0.695 for every 224 pounds weight.

The most reliable dealers in seeds and shoots in this district are Mr. Lorengi, seed merchant, Route du Var (Magnan) in Nice; Mr. Lambert, horticulturist, Nice; and Madame Sarro, horticulturist and florist in said city.

ALBERT N. HATHEWAY,

Consul.

UNITED STATES CONSULATE,

NICE, May 14, 1887.

ROUEN.

REPORT OF CONSUL WILLIAMS.

FOREST AREA.

The manner in which the forests in this consular district have been acquired by the state is as follows:

	Hectares.
In reserve No. 2 Rouen district.....	{ From the royal domain in 1669..... 42,555.51
	{ From ecclesiastical property..... 3,447.84
In reserve No. 7 Amiens district.....	{ From the royal domain in 1669..... 42,886.51
	{ From ecclesiastical property..... 14,920.78

This consular district comprises the entire departments of Eure, Somme, Pas de Calais, The North, and a large portion of the Seine Inférieur.

The control of the forests of these departments is given by the forest administration to two chief commissioners, of whom the one has his official seat at Rouen, No. 2, and the other at Amiens, No. 7.

The reserve of Rouen includes the departments of the Seine Inférieure and of the Eure.

The term applied to the forests which belong to the state is "forêts domaniales." These are subject to the forest regulations, that is to say, that they are controlled in a special manner by the forestry code and decrees of August 1, 1827, promulgated more than twenty-three years later than the Code Napoleon.

This law differs in many respects from the law of 1669, prepared by Colbert, and, though in the main an improvement, overlooks many important regulations for perpetuating the forests which were contained in the old law.

Although the receipts from the products of the forests show little or no increase, as sales of wood and timber have not been urged, the competition of foreign woods making the price so low as to be unremunerative.

The care given to them each year places them in a much improved condition.

The table below gives the extent of forest property in the two departments of Seine Inférieure and Eure:

	Domaniel forests.	Communal forests.	Private forests.
	<i>Hectares.</i>	<i>Hectares.</i>	<i>Hectares.</i>
Seine Inférieure.....	33, 107	597	62, 447
Eure.....	12, 665	140	101, 482

These two departments are in the Forest Reserve No. 2, with headquarters at Rouen. Each reserve is divided among a certain number of inspections. Each inspector has under his orders two chiefs of cantons, a deputy inspector, and a keeper-general. The deputy inspector acts in the absence of the inspector. There are five of these inspections in the two departments. The officer-in-chief at Rouen is called "conservator of forests," and he is assisted in his duties by a deputy inspector or keeper-general.

Under the deputy inspector are brigadiers, each one having under him four or five keepers or "officers in charge," each of whom has in charge a portion of forest, not exceeding 600 hectares.

The products can be classified under two general heads:

1. Those from the wood itself.

2. Contingent products, such as the right of hunting, the removal of the soil, such as stone, gravel, clay, &c., the right of passage through the forest, and of taking water, &c.

The following table indicates the receipts by the government during the year 1886 in each of the two departments which constitute the Rouen reserve:

	Seine Inférieure.	Eure.
	<i>Francs.</i>	<i>Francs.</i>
Principal products.....	990,950	431,325
Contingent.....	112,960	46,675
Total.....	1,103,910	478,000

The expenses were as follows:

First. Salaries paid to agents of all grades.

Second. The expense of maintenance, building roads and forest houses.

Third. Nurseries and transplanting trees.

Fourth. Taxes paid on the land to departments and communes.

Fifth. Miscellaneous expenses.

The expenses in this reserve for the year 1886 were—

	Seine Inférieure.	Eure.
	<i>Francs.</i>	<i>Francs.</i>
Salaries.....	123,270	44,780
Roads and houses.....	36,855	23,200
Nurseries and transplanting	29,095	22,300
Land taxes.....	96,180	36,620
Miscellaneous.....	4,200	790
Total.....	289,600	127,690

The forests belonging to the communes and public institutions are subject to the forestry régime.

The product arising from the cutting of wood can be sold by the forestry administration (the money being paid into the treasury of the commune), or may be delivered in kind, that is to say the wood having been cut under the direction of the mayor of the commune, under the supervision of the forestry administration, can be divided among the inhabitants of the commune. The forestry administration does not interfere with the distribution. The inhabitants of communes which possess forests, can pasture a certain number of domestic animals, such as cows, sheep, and hogs. Certain communes, from a custom of long standing, have assumed the right, which is granted them, of pasturing in the "domanial forests" a limited number of cattle under certain restrictions. The forestry administration allows pasturage to others, who have no right, by custom or otherwise, at so much per head. This practice prevails in the Seine Inférieure, in the forest of Emoy (chiefly oak), the acorns from which are peculiarly adapted to the fattening of hogs.

CUSTOMARY MODE OF MANAGING AND MAINTAINING FORESTS.

The greater part of the "domanial forests" of this reserve are of full grown trees, or are managed with a view of becoming such. The forestry adminis-

tration pursues the course of perpetuating its forests by the natural growth, and by judicious thinning out. When, from any cause, this natural growth does not succeed, other means are resorted to, such as forming nurseries in the clearings.

The subject of forest culture has received much attention and been ably treated by a work entitled, "Manual of Sylviculture," by Bagneris, professor in the school of forestry at Nancy, to which I would refer those seeking further information, which does not come within the scope of this article. This work points out the different processes pursued. There are no forestry schools in this consular district.

Forestry instruction in France dates from the year 1825. The school at Nancy was established by royal command, dated August 24, 1824. Three years later, in 1827, when the forestry code was promulgated, other schools for the instruction of candidates for keepers were authorized. Their organization was, however, deferred, and we find in 1863 one established at Villers-Cotterets, one at Toulouse, and one at Grenoble.

These were not for the instruction of superintendents, but those of a lower grade.

It was only in 1873 that a school for the instruction of the higher officers was established at Barre-Loist.

The forestry guard are recruited from among the lower grade of army officers, or the sons of superintendents or other employes.

The men must be between the ages of twenty-five and thirty-five years, be able to read, write, and cipher, and are subjected to an examination which is by no means rigid.

I have here followed out the details of the Rouen reserve; that of No. 7 at Amiens, also in this consular district, is in much the same proportion, and the figures appear in the tables herewith appended.

I give herewith, as requested, the names of three reliable nursery men, who could fill any orders for trees:

Mr. Charles Wood, No. 6, Rue Sableè, Rouen; Graine, jr., 27 Rue de Sotteville, Rouen; Duboc, 68 Rue Verte, Rouen.

In cutting out dead trees, thinning out, or trimming living trees, not an atom is wasted. The wood is sorted according to size, cut into lengths, and bundled, and is thus sold to bakers, founders, hotels, and private houses. Every twig, though no larger than a knitting needle, is saved, cut into lengths of six or eight inches, bundled and sold for kindlings. The pine cones all are gathered, dried, and sold for kindling fires. There is no manufacture of kindling wood, as in so many cities in the United States, but these small faggots and cones are used instead. To see the care bestowed upon these seemingly small items is a striking commentary on the wasteful methods pursued by Americans in the wholesale destruction of timber.

Forestry statistics.

Departments.	Ownership of forests.					Proportion to extent of territory.
	Private.	State.	Departments and communes.	Public institutions.	Total area of forests.	
<i>Year 1870.</i>	<i>Hectares.</i>	<i>Hectares.</i>	<i>Hectares.</i>	<i>Hectares.</i>	<i>Hectares.</i>	<i>Per cent.</i>
Eure.....	101,482	11,932	54	94	113,562	19
Nord.....	22,149	19,207	1,823	33	43,212	8
Pas de Calais.....	25,596	7,475	426	442	33,929	5
Seine Inférieure.....	62,447	33,972	579	48	97,046	16
Somme.....	35,668	4,218	49	566	40,501	7

Departments.	Classification of trees.					Total.	Clearings made by the state.	Value in silver of product.	
	Wholly state property.		Partially belonging to state.					Total.	Per hectare.
	Deciduous trees.	Resinous trees.	Deciduous trees.	Both deciduous and resinous.	Resinous.				
<i>Year 1870.</i>	<i>Hect's.</i>	<i>Hect's.</i>	<i>Hect's.</i>	<i>Hect's.</i>	<i>Hect's.</i>	<i>Hect's.</i>	<i>Hect's.</i>	<i>Francs.</i>	<i>Francs.</i>
Eure			26,253	91,462	773	112,488	1,074	3,467,759	30. 54
Nord.....		792	41,981			42,773	439	4,980,427	11. 55
Pas de Calais			33,435	148		33,583	356	1,558,314	45. 92
Seine Inférieure			57,726	36,156	2,697	96,129	917	5,122,017	52. 78
Somme.....			40,401			40,401	100	3,382,130	83. 51

Product of forests.

Departments.	Year 1880.	Year 1879.	Year 1883.
	<i>Francs.</i>	<i>Francs.</i>	<i>Francs.</i>
Eure.....	721,214.30	681,417.47	678,645.53
Nord.....	1,606,994.31	1,668,792.47	2,012,500.80
Pas de Calais.....	509,903.01	423,140.67	574,098.48
Seine Inférieure.....	1,804,111.36	1,680,227.66	2,157,759.46
Somme.....	225,968.87	294,791.04	444,490.03

Distribution of ten principal varieties of trees in forests under state control.

	Rouen.	Amiens.
	<i>Hectares.</i>	<i>Hectares.</i>
Beech.....	19,100	15,228
Oak.....	10,723	11,267
Pine.....	4,582	792
Hornbeam.....	7,116	17,791
Various.....	2,850	17,669
Total.....	44,641	62,747

The ten principal varieties which cover 84 per cent. of the surface of these forests throughout France are distributed thus:

Description.	Hectares.	Per cent. of surface.
Oaks	754,144.79	29
Beech	494,359.71	19
Hornbeam	297,115.32	12
Fir	192,117.76	7
Pine	118,392.32	4½
Evergreen oak	109,354.00	4
Maritime pine ..	95,345.00	3½
Norwegian pine	75,346.00	2½
Larch	42,829.00	2
Aleppa	11,980.00	½
Total, 10 varieties	2,190,983.90	84
All other varieties	403,019.93	16
	2,594,003.83	100

SCHOOL OF FORESTRY.

There were, during the years 1876-77, in the schools of forestry, 7 professors, 5 teachers. First year, 16 scholars; second year, 14 scholars; 30 graduates. Thirteen scholars were appointed general guardians of the forest.

CHAS. P. WILLIAMS,
Consul.

UNITED STATES CONSULATE,
ROUEN, *May 26, 1887.*

FORESTRY IN FRANCE.*

BY MAJOR F. BAILEY, R.E.

CHAPTER I.

THE WOODS AND FORESTS OF FRANCE.

In 1876, the last year for which anything like complete details are available, the total wooded area of France, exclusive of isolated trees, such as those growing in parks and on roadsides, which were not planted for the sake of the timber they produce, amounted to 35,464 square miles, or a little more than 17 per cent. of the entire area of the country. The proportion in other European countries is as follows, viz.:

	Per cent.		Per cent.
Russia	40	Greece	14
Sweden	34	Spain, Belgium, and Holland, each	7
Norway	29½	Portugal	5
Germany	26	The British Isles	4
Turkey	22	Denmark	3½
Switzerland	18		

The average of all the European states, taken together, is 29½ per cent. The population of France being 181 per square mile, it follows that the area of woodland per head is about three-fifths of an acre.

Some changes, which will be noted in a subsequent chapter, have taken place in the area of the state forests since 1876, but in that year the woods and forests were owned in the following proportions by the different classes of proprietors, viz.:

	Square miles.	Per cent.
The state.....	3,734	= 10.7
Communes and sections of communes.....	7,949	= 22.4
Public institutions.....	124	= 0.3
Private proprietors	23,657	= 66.6
Total.....	35,464	= 100

and these figures may be taken as fairly representing the actual position at the present time.

Forests are not so exhausting to the soil as agricultural crops. In the case of the latter, the entire plant, except the roots, which are sometimes also taken, is removed, whereas with a crop of trees, the leaves, flowers, and fruit, which are far richer in nutritive elements than the wood, are annually returned to the soil, and thus serve to maintain its productive power, as well as, by their protective action, to keep it in a good physical condition. Hence forests can flourish on comparatively poor soil; some kinds of trees, notably most of the conifers, being able to grow on ground that would be quite incapable of producing a series of remunerative agricultural crops; and it is therefore, generally speaking, out of place to keep rich fertile valleys under forests, which ought rather to be maintained on ground which cannot be profitably cultivated. In well-populated districts, matters naturally tend to settle themselves in this manner; the better classes of ground being brought under the plough, while every acre of the rest of the country is kept wooded, in order to meet the domestic and agricultural wants of a dense population. But it is otherwise in less favored localities. Here vast areas might be devoted to the production of wood; but while, from the nature of the case, the local consumption is in such places very small, the absence of communications frequently renders export very difficult. Hence wood has but a very small value, and the forests tend to disappear gradually before the excessive grazing to which they are subjected; for the population of such regions, being unable to make its living by agriculture, is, generally speaking, driven to adopt a pastoral life.

Forests grow in France at all altitudes up to about 9,000 to 9,500 feet above the sea, a much larger proportion of them being found at low than at high levels. Thus it has been calculated

* From Vol. XI of the "Transactions of the Scottish Arboricultural Society."

that if the country were divided into altitude-zones of 200 meters each (656 feet), the lowest zone would contain 36 per cent. of the forests, while the highest would not contain more than .04 per cent. of them; the fifth zone (2,600 to 3,300 feet, would, however, on account of the extensive plateaus existing at this level, contain more than the fourth. Forests situated at high altitudes do not produce so much wood, and are therefore not so profitable as those grown lower down; consequently the private owners, who have done their best to preserve their woods in the plains and low hills, have, in the majority of cases, allowed the mountain forests they once possessed to be destroyed by over-grazing. Hence it arises that while at altitudes below 4,000 feet, the proportion of state and communal forests is comparatively small, hardly any private woods are found above the level of 6,000 feet, such forests as exist there being, generally speaking, maintained by the state or communes in the public interest, as a protection against avalanches and the formation of torrents. The private forests are then, taken as a whole, more favorably situated than those which belong to the state and the communes, both as regards soil, climate, means of export, and proximity to the markets. It has been calculated that the distribution of the forest area by zones of altitude is thus proportioned:

Altitude.	Forests under the forest department.		Private and communal forests not under the forest department.	Total.
	State.	Communal.		
	Per cent.	Per cent.	Per cent.	Per cent.
Plains..... M. 0 to 200 = Ft. 0 to 656	41	5	45	36
Low hills..... 200 to 500 = 656 to 1,640	32	48	25	31
Mountains above..... 500 = above 1,640	27	47	30	33
	100	100	100	100

It is said that if the trees could be grouped together, so as to form a series of pure forests, the proportion of the total area which would be occupied by each species would be as follows:

	Per cent.
Oak (<i>Q. sessiliflora</i> and <i>Q. pedunculata</i>).....	29
Beech.....	19
Hornbeam.....	12
Silver fir.....	7
Scotch pine.....	4½
Evergreen oak (<i>Q. ilex</i>).....	4
Maritime pine.....	3
Spruce.....	3
Larch.....	2
Other kinds.....	16½
Total.....	100

The small number of species which enters to any important extent into the composition of the French forests is very remarkable. Thus it appears that oak, beech, and hornbeam occupy 60 per cent. of the tree-covered area, more than one-half of the remainder being taken up with six other species; but many other kinds are disseminated throughout the forests in various proportions according to circumstances. As a matter of course, however, the trees are not grouped together in the above manner, and, neglecting blanks, the crop on the ground is actually constituted somewhat as follows:

	Per cent.
Pure forests—Broad-leaved (oak or beech).....	15
Coniferous (silver fir, pine, spruce, or larch).....	13
Mixed forests—Broad-leaved (oak, beech, and hornbeam).....	52
Broad-leaved and coniferous (beech and silver fir, or oak and pine).....	18
Coniferous (silver fir and spruce).....	2
Total.....	72
	100

Or, separating the broad-leaved and the coniferous forests from those which consist of a mixture of the two, we have—

	Per cent.
Broad-leaved forests, pure and mixed	67
Coniferous forests, pure and mixed.....	15
Broad leaved and coniferous forests.....	18

The state forests show a smaller proportion of pure crops than are found in those of the communes, but they also comprise a very much larger proportion of forests in which the crop consists of a mixture of broad-leaved and coniferous species. The first of these differences is due to the circumstance that a mixture, which is always desirable from cultural considerations, has been systematically maintained in the state forests from a remote period, whereas this has not always been the case in the communes. The second difference is chiefly accounted for by the fact that those parts of the state broad-leaved forests, where, from various causes, the soil has become much deteriorated, have frequently been planted up with conifers, which are the only kinds likely, on account of their capacity to grow on poor soil, to succeed under such conditions; but these are in such cases, only intended to act as nurses to broad-leaved species, which are subsequently to be raised under their shelter. But little work of this kind has yet been accomplished in the communal forests from want of the needful funds. The private forests resemble those of the communes rather than those which are state property, but a further comparison in this respect between them and the other classes of forests need not be made at present.

Many circumstances combine together to influence the nature of the vegetable growth, which characterizes any particular locality. Thus, a "limestone soil," which is one containing more than four or five per cent. of carbonate of lime, is usually marked by a rich and varied vegetation; while on a silicious soil the flora is much more simple and uniform, the undergrowth being often formed of bilberry (*vaccinium myrtillus*), broom and heather. Forty-four per cent. of the French forests are on limestone. But the principal forest trees are not much affected by the chemical composition of the soil, the two deciduous oaks, the beech, the hornbeam, silver fir, spruce fir, the larch, being classed as "indifferent" to it. The evergreen oak, however, shows a preference for limestone; and the Scotch pine flourishes best on a silicious soil; but the maritime pine will not grow on limestone. The climate, which varies with the latitude, altitude, amount and distribution of the rainfall, proximity, or otherwise of the sea, and other conditions, is the principal factor in determining the distribution of trees, each of which finds its home in the locality which best suits its temperament. The hot region of the south, the temperate regions of the north and center, and the mountains, are each characterized by the spontaneous vegetation to which they are adapted. Thus, in the south, are found the evergreen oak and the maritime pine; while the spruce, the silver fir, and the larch inhabit the mountains; and the five other species mentioned, grow chiefly in the temperate region. The physical condition of the soil also exercises an important influence on the growth and local distribution of trees; for example, *quercus pedunculata*, and the hornbeam, will grow on moist soil, which does not suit either *quercus sessiliflora*, the beech, or the evergreen oak.

During the entire course of their development, trees of all kinds require light; but during the early stages of their existence, some of them must be completely in the open, without any cover at all; while for others, various degrees of shade are necessary. This quality of the young plants is, generally speaking, in direct relation to the abundance of the foliage of the adult tree from which they spring. Those which, when young, require much light, such as the larch, the pines, and the oaks, are called the "robust," or trees of light cover, while others, which will not stand exposure, such as the beech and silver fir, are called "delicate," or trees of heavy cover. The spruce and the hornbeam are classed intermediately between kinds of light and heavy cover. This is a very important question to the forester, not only with reference to the method to be adopted for raising a crop of any particular kind of trees,

but also with regard to their coppicing power, their effect on the soil, and other matters. Trees of light cover, generally speaking, coppice better than those of heavy cover, but the latter have a much greater effect than the former in improving the soil.

It is estimated that the 35,464 square miles of woods and forests yielded the following produce in 1876, viz.: 17,896,227 loads (50 cubic feet) of wood of all qualities, 321,741 tons-weight of tanning bark, 2,556 tons-weight of cork, and 31,539 tons-weight of resin; the whole being valued at £9,471,017. The average production of wood was therefore 39 cubic feet per acre; and the gross revenue, omitting that on minor produce, which was very small, was equal to 8s. 4d. per acre. But, in addition to this, it is calculated that the isolated trees, not grown for the sake of their timber, and vines yield together three and one-half million loads per annum, valued at £1,000,000; so that the total production of wood in France is raised to about twenty-one and one-half million loads, and the value of the wood, bark, and resin to about £10,500,000. This gives the amount of wood and the money value of the forest produce per head of the population as 29½ cubic feet, and 5s. 9d. respectively.

Of the twenty-one and one half million loads of wood produced, about four million loads were timber and the rest firewood. The latter sufficed for the national requirements, but the former was far from doing so; for the imports of wood of this class exceeded the exports by 2,062,432 loads, valued at £6,408,000—that is to say, that it was less than two-thirds of the amount required. The question of foreign timber supply is, therefore, a very important one, even for France, which has 17 per cent. of its area under forest.

CHAPTER II.

FORESTS MANAGED BY THE STATE FOREST DEPARTMENT.

The forest law of 1827, which is still in force, confirmed the previous legislation, under which all woods and forests which form part of the domain of the state, all those which, being the property of communes or sections, or of public institutions, are susceptible of being worked under a regular system, and finally all those in which the state, the communes, or public institutions possess a proprietary right jointly with private persons, are administered directly by the state forest department in accordance with the provisions of the forest law.

The areas thus administered at the commencement of 1885 were as follows, viz.:

	Hectares.	Square miles.
State forests.....	1,012,688	= 3,910
Communes, sections, and public institutions.....	1,967,846	= 7,598
Total	2,980,534	= 11,508

These figures, which include the dunes, represent about 5½ per cent. of the entire area of France, and nearly one-third of the total wooded area. An additional 144 square miles of barren land had, up to the end of 1884, been purchased by the state in connection with the project for the consolidation of bare and unstable slopes on the great mountain ranges; and this area is also administered by the department under the forest law. About 40 per cent. of the state forests are situated in the plains, while the rest of them, together with nearly the whole of the communal forests, are found in about equal proportions on low hills, up to an altitude of 1,700 feet, and on the higher mountain ranges. About one-half of them stand on limestone rock, 92 per cent. of their entire area being actually under wood.

The principal object of the following pages is to sketch in a brief and summary manner the system of management adopted for these forests, so that some general idea may be formed of what the business of the French forest department consists in, and what the results of their labors have been, up to the latest date to which information is available under each head. The organization of the professional staff of the department, and the manner in which it is recruited, will then be explained.

STATE FORESTS.

The forests now belonging to the state owe their origin to one or the other of the following sources: They either formed part of the ancient royal domain, as it was constituted at the time of the ordinance of 1669, or of the sovereign domains united to France since that year; or else they were ecclesiastical property confiscated at the time of the Revolution in 1790, or they have been more recently acquired by purchase, legacy, or gift. About one-half of them are ancient royal domains.

The state forests were formerly of much greater extent than they are at present. In 1791 they covered an area of 18,166 square miles, which was reduced to 3,792 square miles in 1876, the reduction being almost solely due to sales effected for the benefit of the exchequer; but the loss of territory after the war of 1870 was the cause of a diminution of 374 square miles. The records show that, between 1814 and 1870, 1,362 square miles of state forests were sold for nearly twelve and one-quarter million pounds sterling, or about £14 per acre; but since 1870 no such sales have taken place, and since 1876 the area has been somewhat increased by purchases and otherwise. It now includes 33 square miles of forest owned jointly with private persons, and 450 acres are temporarily held by the families of some of Napoleon I.'s generals, whose right will in the course of time either lapse or be commuted. The remainder of the area is owned absolutely by the state, but the enjoyment of the produce does not belong exclusively to the treasury, for, as will be explained hereafter, certain groups of rightholders participate in it.

In the next section, the principal points of the laws relating to the communal forests, and of their management by the state forest department, will be brought to notice; while in the subsequent sections of this chapter the work of the department in connection with the state and the communal forests will be briefly treated of in such a manner as to bring out and compare the results obtained in the two classes of forests.

FORESTS BELONGING TO COMMUNES, SECTIONS, AND PUBLIC INSTITUTIONS.

The territory of France is divided into 39,989 communes or village communities, of which about one-third are forest proprietors. Certain groups or sections of the inhabitants have, however, rights, and own property, apart from the commune in which they reside, and these are also owners of considerable areas of woodland. Those forests belonging to communes or sections, which are susceptible of being worked on a regular system, are managed directly by the state forest department for the benefit of their owners, the principal features of this management being as follows, viz.: The laws relating to state forests are, generally speaking, but with certain exceptions, applicable to them; they cannot be alienated or cleared without the express and special sanction of the government in each case; they cannot be divided up among the members of the community; the annual sales of produce are effected by the state forest officers, and the money realized is paid directly by the purchasers into the communal treasury; before the sale take place the quantity of timber and firewood required by the inhabitants for their own use is made over to them usually standing in the forest, and it is subsequently worked out by a responsible contractor; three-quarters only of the total annual yield is available for distribution or sale, the remaining quarter being left to accumulate, and thus form a reserve fund or stock of timber from which exceptional necessities either in the way of wood or money can be met; the distribution of firewood is made according to the number of heads of families having a real and fixed domicile in the commune; the entry of goats into the forest is absolutely prohibited, while the grazing of sheep is only permitted temporarily, and under exceptional circumstances, with the special sanction of the government in each case; no grazing of any kind can be carried on in the forests, except in places declared out of danger by the forest officers, who have the power to limit the extent to which it can be practiced with reference to the quantity of grass available; the forest guards are chosen by the communal authorities, subject to the approval of the forest officer, who delivers to them their warrants; the state defrays all expenses of management, including the officers' salaries, the marking of trees,

notifying of sales, office charges, and the prosecution of offenses; the state is reimbursed by the payment from the communal treasury of a sum equal to 5 per cent. on the sales of principal produce, including the value of the wood made over to the inhabitants; but this payment, which forms a first charge on the forest revenue, can never exceed the rate of 1 franc per hectare (about 4d. an acre) of the total area thus managed; the communes pay the guards' salaries, the taxes, and all charges for the maintenance and improvement of the forest, including planting, sowing, and road-making, as well as those for extraordinary works, such as demarcation, survey, and the preparation of working plans. In all this the forest officers are bound, by law, to act on the principle that they are managing the property for the benefit of its owners, who must be consulted through their representatives, the mayor and municipal council, in all matters affecting their interests, and whose wishes must be acceded to when they are not opposed by the legislation, or contrary to the recognized principles of scientific forest management.

The principal public institutions are hospitals, charitable associations, churches, cathedral chapters, colleges, and schools; and the forests belonging to them are subject to administration by the state forest department on precisely the same terms as are those of the commune and sections.

Of the area of 7,598 square miles shown as being thus managed on behalf of these bodies at the commencement of 1885, about 100 square miles belong to public institutions, and about 7,500 square miles to communes, including sections. Of the remainder of their forests, about 410 square miles owned by the latter, and about 27 square miles by the former, are managed respectively by the communes themselves under the municipal laws, and by the administrative councils of the institutions.

Changes in this respect frequently take place; for every year a certain number of applications to free forests from the restrictions which state control involves are granted, while in other cases the owners demand or consent to their imposition. The records show that sanction has, since the year 1855, been accorded to the clearing of 35 square miles and to the alienation of 40 square miles of the forests belonging to these bodies, but it is probable that the permission has not, in all cases, been acted on.

For the sake of convenience the forests belonging to communes, sections, and public institutions, will in future be spoken of collectively as "communal" forests.

DEMARCATON AND SURVEY.

Up to the end of 1876 the work of demarcation had made good progress in the state forests, only 13 per cent. of which then remained to be completed, while 30 per cent. of the communal forests had still to be dealt with. The demarcation is indicated by dressed-stone pillars, with intermediate ditches or dry-stone walls, according to the custom and resources of each locality. The ground is usually re-surveyed after the demarcation has been completed, and at the end of 1876 about three-fourths of the state forests and one-half of the communal forests had been thus re-surveyed and mapped, the prevailing scale being $\frac{1}{32000}$ ($12\frac{3}{4}'' = 1$ mile) and $\frac{1}{16000}$ ($6\frac{1}{2}'' = 1$ mile). Pending the completion of this work, the old maps are used for such of the forests as have not yet been re-surveyed. In the communal forests the work of demarcation and survey is less advanced than it is in the state forests, because the charges for such work have to be defrayed from the communal treasury, and the needful funds are not always forthcoming.

SYSTEMS OF CULTURE.

The climate of France is singularly favorable to the natural regeneration of forests, which is, generally speaking, relied on—planting and sowing being only resorted to in the comparatively rare instances in which success cannot otherwise be achieved, such cases including, of course, the stocking of extensive blanks.

There are two main systems of culture—one known as "high-forest," and the other as "copice."

A high-forest, which is usually destined to produce timber of large size, is one composed of trees that have been raised from seed, its regeneration being effected by means of seed, generally speaking self-sown. There are two methods of treating the forest in order to produce this result. In one of these the trees of each age-class are grouped together, and are subjected to periodical thinnings, until the time arrives for regeneration, which is effected by a series of fellings, the first being a more or less light thinning, intended to promote the formation of seed and the springing up of the young seedling plants. The seed-felling, as this is called, is followed at intervals by a series of secondary fellings, usually three or four in number, which are made in order to meet the gradually increasing requirements of the young growth in the way of light; and ultimately the remainder of the old stock is removed by a "final felling." In this manner the marketable stems are gradually cut down and disposed of, the young crop being left to go through the same stages as its predecessor, and so on throughout successive generations of trees. In the selection method (known as *jardinage*), on the contrary, the trees of all ages are mixed over the whole area of the forest; there are no regular thinnings of the kind made under the first method; and the annual cuttings are effected by taking marketable trees here and there within a certain area of the forest, the blocks composing which are successively treated in the same manner, so that the entire forest is worked over within a fixed period of time. When treated by the first method, the forest is grown under very artificial conditions; for the age-classes are never in nature found thus grouped together; but by the selection method, on the contrary, a more or less near approach to a natural forest is obtained.

In the coppice system the regeneration is principally effected by means of coppice shoots. There are two methods of treatment—*simple coppice*, in which there are no reserved trees, and the crop is clean-felled over successive portions of the forest; and *coppice under standards*, in which standard trees are selected and reserved, with a view to their remaining throughout several generations of coppice shoots—generally at least three, but often four or five. Many forests are now undergoing conversion from the system of coppice to that of high-forest.

The following statement shows the extent to which the two systems were applied in the state and communal forests, in 1876, since which year no important changes have taken place. The areas are given in square miles:

	High-forest.	Under conversion.	Coppice.	Pastures.	Total.
State forests.....	1,648	1,121	740	225	3,734
Communal forests.....	2,229	54	4,808	92	7,183
Total	3,877	1,175	5,548	317	10,917

It will be seen that there is a marked difference between the state and the communal forests in this respect. In the former nearly three-quarters of the total area are either now under high-forest or under conversion to that system; while in the latter two-thirds of the total area are under coppice, and less than one-third is either under high-forest or under conversion.

High-forest being usually destined to produce large timber, the trees must be left standing until they have attained a considerable age; and the capital, both in timber and money, which is locked up in it is therefore, much larger than that in a forest under coppice. Other conditions being equal, the quantity of wood produced annually is, however, much the same under both systems; but owing to the greater value of the produce obtained from the high-forest, its money revenue is greater than that of the coppice, while on the other hand it is found that coppice yields a higher rate of interest on its smaller capital value than high-forest, and on this account it is a more suitable system for adoption by communes. Coppice possesses, also, a further advantage for them, in that it yields for the use of the inhabitants timber and other produce more varied in kind and dimensions than are obtainable from high-forest, and it thus satisfies their requirements, which are chiefly in fuel and small-sized timber, much better than forests managed under the latter system. But even in cases where the conversion of communal

coppice to high-forest is deemed advisable, it is always found difficult to reduce the annual fellings to the quantity necessary in order to allow the growing stock to accumulate to the required extent; while the small size of the greater part of these forests renders them unsuited to the treatment which they would have to undergo in order to effect their conversion. The coppice system, including coppice under standards, is therefore in vogue in almost all communal broad-leaved forests, such high-forest as the communes possess being found chiefly in mountainous regions, and being composed of coniferous trees, which will not coppice. The area of communal forest shown as under conversion consists principally of tracts in which the coniferous trees are spontaneously taking possession of the ground and driving out the broad-leaved species. It follows from what has been said above that the state alone can, generally speaking, raise broad-leaved high-forest on a large scale, or undertake the conversion of coppice to high-forest.

A further difference between the systems of culture generally adopted for the state and the communal forests may be noted, viz., that whereas in the former less than one-fifth of the high-forest is treated by the selection method, three-fourths of the communal forests are so treated. In mountainous regions, where, as has just been said, the greater part of the communal high-forest is found, the selection method possesses incontestable advantages, in consequence of the continuous cover which it affords to the soil; but although the respective merits of the two methods, as applied to coniferous forests situated in such regions, are much disputed at present, there has of late years been an undoubted tendency to return to selection, which has for some time past fallen into discredit, and, taking the state and communal forests together, somewhat more than one-half of the total area of their high-forest is now treated in this manner.

Two variations of simple coppice are sometimes practiced: (1) That known in the Ardennes as *sartage*, in which, after the wood has been cut and removed, the twigs and chips are burnt on the ground, in order that their ashes may give to the soil sufficient manure to permit of the growth of a crop of cereals during the year immediately following the cutting. This system, which, as carried out in France, seems to be practiced rather for the sake of obtaining the crop of corn than as a method of forest culture, is gradually dying out. It is not adopted in the areas under the state forest department. (2) That known as *foretage*, in which, instead of clean-cutting the coppice, those shoots only are taken which have attained to certain fixed dimensions, the operation being repeated annually, or after intervals varying from two to five years. *Foretage* prevails chiefly in the valley of the Seine, in the forests from which the fuel supply of Paris is drawn; but it is also employed in the mountainous districts of the south, in the case of forests maintained for the protection of steep slopes, which it is undesirable to denude entirely.

It is impossible here to enter into anything like full details regarding these sylvicultural questions. To study them completely, as they are taught and practiced in France, reference must be made to the books on the subject, among which may be mentioned "The Manual of Sylviculture," by G. Bagnier (translated into English by Messrs. Fernandez and Smythies), Rider & Son, London; and "*Le traitement des bois en France*," by C. Broillard, Berger-Levrault, Paris.

WORKING PLANS.

Working plans or schemes will, in course of time, be prepared for all forests administered by the forest department. The law provides that all these forests shall be subjected to the provisions of such plans, and that no fellings which are not provided for therein, and no extraordinary cuttings, either from the communal "reserve," or in the blocks destined to grow from coppice to high-forest, shall be made without the express sanction, in each case, of the government, by whom all plans must be approved before they can be adopted.

Subject to due provision being made for the exercise of rights of user, the working plan provides for the management of the forest in the way that will best serve the interests of the proprietor. Unlike an agricultural crop, which ripens and is gathered annually, trees take many years to grow to a marketable size, the actual period that they require being dependent not only on their species and the natural conditions under which they are grown, as climate,

soil, &c., but also on the use to which they are to be put. Thus, a coppice being required to yield wood of small size only, may be cut every twenty-five to forty years; whereas a high-forest, which is destined to produce large timber, must stand for a much longer time. It would be excessively inconvenient if the entire crop of such a forest were felled only once in every 100 or 150 years; and it is chiefly to avoid this that a working plan is required, which prescribes the arrangement necessary in order to allow of the produce being taken out annually, without intermission and in equal quantities, so that a regular and sustained income may be drawn from the forest. For example, a simple coppice thirty acres in extent, of which the crop is to be felled at the age of thirty years, might either be entirely cut down at one time, and then allowed to grow up again for thirty years; or, which would be found much more convenient, it might be divided into thirty one-acre compartments, each of which is to be felled in succession, so that by taking one plot each year, the whole area would be worked over in thirty years. The working plan must then, in the first place, prescribe the age at which the trees are to be felled, with reference to the average number of years that they take to arrive at maturity, or to attain the required size; and it must then fix the yield, or the amount of wood to be annually removed, this quantity being expressed either in the form of an area to be cut over, or a number of cubic feet of wood to be taken out. But in the case of a high-forest managed under the selection method, it is sufficient to fix the number of trees of a minimum size to be cut out annually.

The provisions of a working plan vary according to the nature of the forest to which it relates. In the case of the simple coppice instanced above the first thing to do would be to obtain a map showing the principal features of the ground, such as the edge of the plateau, the stream, and the road. The area would then be broken up, for purposes of examination and description, into temporary plots, each plot comprising a portion of forest more or less homogeneous in its composition. This study of the crop would enable the area to be divided into the thirty permanent compartments above alluded to, and it would also determine the order in which they should be numbered, so that the older portions might be cut first. It is evident that if one of these be cut every year the series of compartments will, after the lapse of thirty years, contain forest of all ages, from one to thirty years; and if the annual felling be invariably made in the oldest compartment, it is evident that the age of the crop cut will always be thirty years.

To make a working plan for a regular high-forest, to be treated by successive thinnings, is not quite such a simple matter. If the forest is of great extent, it is, first of all, divided into two or more series or sections, each of which is dealt with separately. After the examination and description of the temporary plots the section is divided into a number of equal compartments called *affectations*, and when the ground has once been completely worked over the crop on each of these will always be within certain limits, in the same stage of development, and subjected to the same kind of treatment. Thus, if the trees are to be felled at the age of 120 years, and there are six compartments, the sixth may contain the young growth, aged from 1 to 20 years; the fifth young poles from 21 to 40 years old, and so on; the first containing the old trees which are to be felled. The compartments having been formed each of them is then subdivided into compartments usually corresponding in number with the years over which the fellings within it are spread (twenty in this case), and, while the trees are being cut in the first compartment clearings and thinnings of various recognized degrees are going on in the compartments of the others, until each in its turn arrives at the age at which the trees are to be removed; and it is clear that in this case also the forest will ultimately contain a due proportion of trees of all ages, from 1 to 120 years, which is an essential condition. The working plan prescribes the order in which all this is to be done, and it lays down the number of cubic feet of timber of the oldest class which are to be taken out annually from the first or oldest compartment, so that the entire stock on it may be removed within the first period of twenty years, windfalls and dead or dying trees being always taken first; each of the remaining compartments is similarly dealt with when its turn to be felled arrives. The quantity of wood to be removed by thinnings cannot be prescribed by the working-plan,

as they must be made to the extent which is judged necessary in order to develop the trees which are left. The forester's art is to do this skilfully, and ultimately to remove the old trees in such a manner that they may leave behind them a young self-sown crop to take their place, and so on throughout successive generations.

For a high forest to be managed under the selection method the arrangement is different. Here it is, of course, equally necessary that all the age-classes should be represented in due proportion, but instead of the trees or poles of each class being grouped together in separate compartments, all classes are mixed indiscriminately over the entire area of the forest, and there is thus no necessity for the formation of *affectations*, or compartments, of the kind just described. After the main features, such as the streams, ridges and roads, have been laid down on the map, the temporary plots, and the descriptions of them are made as before. The forest might, in the present case, be divided into three sections, the upper of which being on the crest of the hill, is required to be kept as dense as possible, and will not be dealt with in the working plan, as dead or dying trees alone will be removed from it. Suppose that the annual yield of the central section, which is 150 acres in extent, has been fixed with reference to the estimated rate of growth and degree of completeness of the stock, at 50 cubic feet per acre, and that trees of marketable girth within it contain on an average 100 cubic feet of timber, it follows that the number of such trees which may be removed annually from the section is $\frac{150 \times 50}{100} = 75$. Theoretically this number should be taken one here and one there over the whole area; but this would be very inconvenient, so the forest is divided into twelve or any other convenient number of equal or nearly equal blocks, from each of which, in succession, the entire number of trees is to be cut; after taking windfalls, the choice falls on the ripest trees, those which are dead or dying being selected first. The section below the road is in another zone of vegetation; it is 100 acres in extent, and its annual yield is calculated at the rate of 60 cubic feet per acre. Suppose, then, that the trees of marketable girth contain on an average 110 cubic feet of timber, the number of such trees to be cut annually is $\frac{100 \times 60}{110} = 54$. The section will then be divided into blocks, from each of which in succession the entire number of trees is taken. In this manner each zone of altitude may be dealt with on its own merits, while, at the same time, the annual fellings, being localized, are easy to supervise, and the wood can be disposed of more readily and more profitably than if the trees had been felled here and there over the entire area. The working plan for a forest under conversion would, of course, differ from any of the above; but this somewhat complicated question will not be dealt with here. It is only by an arrangement similar to one of those above briefly sketched that a permanent annual yield of a particular class of produce can be assured, and that the forest can be secured against the risk of gradual extinction.

A special branch of the forest department is charged with the preparation of working plans, which are not made by the local officers, except in the case of small forests, the plans for which they can frame without interference with their ordinary duties; but they undertake the revisions, which are made every ten or fifteen years in order to guard against errors, and to allow for changes in the rate of growth, or other causes of disturbance. Pending the preparation of such regular plans the forest department draws up provisional rules, which must accord with local usages, where these are not opposed to the recognized principles of sylviculture. Up to the beginning of 1877 regular working plans had been completed for more than two-thirds of the total area of the state forests, and for somewhat less than one-half of the communal forests. The work progresses more slowly in the latter than in the former, because in their case the funds have to be provided by the communes, and the money is not always available; but as a matter of course the most important forests were taken in hand first, and these have for the most part been completed.

The question of working plans has only been dealt with above in an extremely superficial manner. In order to gain anything like a complete idea of the systems pursued in France the following works should, among others, be studied, viz.: "*Aménagement des forêts*," by

C. Broillard, Berger-Levrault, Paris, 1878, and "Aménagement des forêts," by A. Puton. A translation of the latter work has appeared in vols. viii and ix of the "Indian Forester."

PRODUCTS OBTAINED FROM THE FORESTS.

The yield in wood of various classes having once been fixed by the working plan it is the business of the department to realize it as nearly as circumstances will permit. As to tanning bark, all that the felled trees or poles will yield is utilized. Cork bark is taken from the living trees, which will not bear the removal of a too large proportion of their protecting covering, and hence care has to be taken not to overwork them. Resin is collected on a large scale in forests of the maritime pine (*pinus maritima*), which only yield it freely on the hot and damp coasts of the southwest.

The yield of minor produce, such as grass, moss, litter, and other things, being small, and details regarding it not being available, this class of products cannot receive more than a passing mention. Neither can account now be taken of the numerous advantages which the forests undoubtedly render to the population, but which cannot be expressed in the bulk or weight of the products drawn from them.

The latest available statement of yield relates to 1876, in which year the state and communal forests taken together gave 5,620,663 loads (50 cubic feet) of wood, or an average of about 40 cubic feet per acre; also 50,742 tons of tanning bark, 292 tons of cork bark, and 1,967 tons of resin.

The yield of wood per acre of the state forests somewhat exceeded that of the communal forests; but while, in explanation of this, it must be said that the greater extent to which grazing is practiced in the latter affects their wood production unfavorably, it must also be admitted that a large proportion of their produce is made over to the inhabitants for their own use, and that this is estimated at a low figure, so as to reduce, as far as possible, the charges against them on account of management by the forest department; and the apparent difference is largely due to the latter cause. Of the total yield in wood 1,364,846 loads were timber and 4,255,817 loads were firewood; and, as might be expected from what has been said, before regarding the different systems of culture adopted, the state forests gave the larger proportion of timber, one-third of the wood from them being of that class, while in the case of the communal forests the proportion of timber was only one-fifth. A still more striking result would follow a comparison of the nature of the produce obtained from the state and from private forests; and since timber is a more useful and valuable product than firewood the advantage to the country, from this point of view, of considerable areas of forest land being owned by the state is apparent, and the more so when it is remembered that France does not grow more than two-thirds of the amount of building-timber that she consumes.

The communal high-forest is for the most part situated in the mountains, and is composed of coniferous trees, which explains the fact that the greater part of the timber derived from the communal forests is fir and pine, whereas only about one-third of that coming from the state forests is of those kinds.

SALES AND EXPORT.

Principal produce (wood, bark and resin).—With the exception of the produce made over to right-holders, and of that delivered to the inhabitants of the communes from their forests for their own consumption, as well as of comparatively small quantities of timber cut in the state forests for the war department and admiralty, the whole of the annual produce is sold by public auction, and no other mode of sale is permitted. There are three principal systems of disposal, viz.: First, sale of standing trees; second, sale at a rate per cubic meter, or other unit of the produce, cut, converted and taken out by the purchaser; and third, sale of produce cut and converted by departmental agency. The first of these systems necessitates a previous marking, either of the trees which are to be removed, or of those which are to be reserved. There is no guarantee given either as to the number of trees, or as to their species, size, age or condition; but they are bought and sold on the best estimate that either

party can make of their value as they stand. The purchaser, as a matter of course, cuts up and exports the wood at his own cost, and in the form which best suits him, being bound under severe penalties to carry out this work in the manner prescribed by the conditions of sale. It has been urged that this system needlessly introduces a middle man between the producer and the consumer, and that thus the profits of the former are reduced, while the regeneration of the forest may be compromised by felling and exporting the trees in a careless or ignorant manner; but in reply to this it may be said that the wood merchant must always exist, as it is but rarely that the actual consumer can himself go to the forest to get what he wants, and that by strictly enforcing the conditions of sale, which are framed with special regard to this object, interference with the regeneration of the forest is practically avoided.

The second method differs from the first only in that the auction sale determines the *rate* at which each of the various classes of produce is to be paid for; but it is open to the objection that the classification of the produce is difficult, and it thus leads to frequent disputes, in the settlement of which the interests of the proprietor (state or commune) may be allowed to suffer. This method is rarely adopted, except in the case of thinnings, when the quantity of wood cannot well be accurately estimated beforehand.

The sale of timber, cut and fashioned by departmental agency, is rarely resorted to. It has certainly the advantage that the work is better done, and that more complete precautions can be taken to secure the regeneration of the forest; but on the other hand the state or the commune, as the case may be, must advance all the money for the work, and the forest officers become charged with a large amount of supervision and accounts, while a number of purchasers are admitted to the forest, and offenses of various kinds are from time to time committed by them. But the chief objection to the system is that the wood is not always cut up in the manner which best suits the requirements of the market at the moment, a matter with which the forest officer can never be so well acquainted as the professional timber merchant, and thus not only do the general interests of the country suffer by failure to supply wood in the form in which it is most required by the consumers, but the prices realized are not always so good as those which the produce might have been made to fetch had it been cut up in some other manner.

Timber sold standing usually commands a higher rate than it does when disposed of in any other manner, and for this and the other reasons that have been given the first of the three systems is the one generally adopted in both the state and the communal forests. This method of sale is not generally followed in other European countries; but the French system has stood the test of experience; and it is greatly facilitated by the honesty which, as a general rule, prevails in the trade to which it has given rise.

In consequence of the absence or insufficiency of export roads in Corsica, and of the difficulty experienced in getting purchasers who were willing to take the produce for a single year only, a law was passed in 1840, which enacted that the timber to be cut in any part of that island during a series of years, not exceeding twenty, might be sold at one time to a single purchaser, the state, at the expiry of the term, becoming possessed of all works erected by him without liability to the payment of compensation for them. A few of such contracts exist to the present day; but both the system of roads and the timber trade having largely developed during the last forty-five years the practice of entering upon such engagements is gradually dying out.

Minor produce.—Receipts on account of minor produce form an insignificant portion of the gross revenue derived from the French forests, the most important item being that which is due to the sale of hunting and shooting permits. Produce of this class is not sold so much as a source of revenue, as to enable the agricultural population to make use of it, without giving rise to the idea that they are entitled to it by right. It is sold by private contract, the price being fixed by the conservator, or by the prefect, or the mayor, in the case of the state and communal forests respectively. The conditions under which such sales are effected in the state forests are determined by each conservator, with reference to local circumstances; and he

retains the power to forbid the sale from the communal forests of any classes of produce, the removal of which would, in his opinion, be detrimental from a cultural point of view. Payment for minor produce is often accepted, especially by the communes, in the form of days' work done in the forest.

Wood supplied to the admiralty.—Every year a notice is sent by the forest department to the admiralty, showing the localities in which trees suitable for naval purposes are to be felled; and the latter department then notifies the number and description of those which it desires to have reserved in each forest. The purchaser of the timber sold from these blocks fells, barks, and conveys the trees marked for the above purpose to an appointed place in the forest, where they are inspected and taken over by the admiralty officials, who cut from them what they want, the rest of the wood being sold by the forest department in the ordinary manner. The forest officer and the marine engineer then agree upon the sum to be paid as the price of the wood removed, and as compensation, to cover losses caused by the depreciation in value of that rejected, and the account is subsequently adjusted in the financial department. Up to the year 1837, the admiralty had the right to select trees everywhere, including the private forests; but the system was not found to answer, and it was abandoned in that year. Even under existing regulations, a very small proportion of the wood used by the admiralty is obtained directly from the forests, the greater part of it being bought in the open market.

Wood supplied to the war department.—The requirements of the war department are met as far as possible from the state forests, the trees being marked and felled by the forest department, and removed either directly by the military authorities or by the forest department at their cost. The account is adjusted in the financial department. But the amount of wood so supplied is very small, as, except in cases where the state forests lie near the fortifications or garrison towns, it is found more convenient and cheaper to purchase what is required in the market.

ROADS AND BUILDINGS.

Without roads, which are required in order to render the forests accessible, and to facilitate the export of produce, this form of the natural riches of a country cannot be utilized; the construction of good export roads being one of the most important means that can be adopted for raising the forest revenue. Thus, in Corsica, where before 1850 the state forests did not produce more than £200 a year, the annual revenue derived from them was raised in 1868 to £8,000, the improvement being due almost entirely to the development of the communications. At the end of 1867 there were 2,440 miles of metalled and 5,380 miles of unmetalled roads in the state forests, and since that year their length has been at least doubled.

The great importance of accommodating the forest guards in suitable houses within the forests is fully recognized; and out of 3,200 guards, 1,400 are lodged in 1,213 houses, the remainder of them being granted allowances to lodge themselves in neighboring villages. The proportion of roads and buildings in the communal forests is much less than in the state forests, partly because the communes have to pay for their construction and funds are not always available, but partly also because the average size of these forests being smaller, roads and guards' houses within them are not needed to the same extent.

At the end of 1867 there were 126 saw-mills in the state forests, all worked by water-power.

Timber-slides, sledge-roads, wire-rope tramways, and such-like means of exporting the wood are very little used in France. A great deal of timber is required for their construction and maintenance, and considering the price that wood of all kinds can command, it is found better and cheaper, even in mountainous regions, to make permanent roads suitable for timber-carriages and carts. They are to be found only in a few localities where the conditions are exceptional.

Portable iron tramways have not yet come into general use as a means of exporting timber from the forests, and it is believed that there is only one in use in France at the present time, viz.: that at Baccarat at the base of the Vosges; but the advantages which the employment of

this means of transport affords will doubtless shortly be better understood than at present, and a development of the system is to be anticipated—at any rate, in the forests of the plains. The floating of large timber is almost unknown; but firewood for the supply of Paris is still floated from the hills of Morvau down to the railways.

FINANCIAL RESULTS OF WORKING.

The profit derivable from a forest is dependent on a number of causes, among which may be mentioned the species of which the crop is composed, the depth and nature of the soil, the climate, the system of culture, the proximity of great centers of consumption of produce, and the existence of good lines of export.

Taking the average of the last three years for which the accounts have been audited, it is found that the receipts, expenditures, and surplus of the state forests were as follows, viz.:

Revenue.....	£1,297,748 = 10s. 6d. per acre.
Expenditure.....	571,347 = 4s. 7d. per acre.
Surplus.....	726,401 = 5s. 11d. per acre.

But if the money spent on the afforestation of mountain slopes and dunes, and on the purchase of additional areas, be excluded, the expenditure on the existing forests is reduced to to about £480,000, and the surplus is raised to 6s. 8d. per acre. The actual profit is indeed slightly more than this; for the figures include both expenditure by the state on the management of the communal forests, and the contributions paid by the communes on this account. The receipts are supposed to cover the payments, but they rarely do so, and some allowance may be made for this fact when calculating the net profit derived from the state forests, which, during the years referred to, probably fell little short of 7s. an acre. Recent information relating to the receipts, expenditures, and surplus resulting from the working of the communal forests is not available.

The latest year for which full details regarding the gross revenue per acre of the state and communal forests are obtainable is 1876, when the figures were as follows, viz.:

	State.		Communal.		Mean.	
	s.	d.	s.	d.	s.	d.
Principal produce (wood, bark, resin).....	12	6	7	5	10	0
Minor produce.....	0	7	0	3	0	5
Total.....	13	1	7	8	10	5

The revenue from the state forests was then, in 1876, considerably higher than that above given as the average of the last three years; and this was due to two causes, of which the first is the exceptionally large number of windfalls which occurred in that year, and the second the comparatively high rates which timber then realized. All but a small fraction of the revenue on the principal produce was obtained by the sale of wood and tanning bark, cork being produced only in the forests near the Mediterranean and in Corsica, and resin almost exclusively on the shores of the southwest. The figures relating to the state forests show the results of actual sales; but this is not so in the case of communal forests, as a large proportion of the produce from them is made over to the inhabitants for their own use, and its value is estimated at a low rate, in order to keep down the amount of their contribution for the services of the state forest department, which is levied in proportion to the sum of their gross revenue and the value of the wood delivered to them. In addition to this, it should be said that the revenue on minor produce shows cash receipts only, no credit being taken for the payments made chiefly in the communes by means of days' work done in the forests. These circumstances account to some extent for the smaller revenue obtained from the communal forests; but the true explanation of this result is to be found in the important influence exercised by the system of culture adopted. In 1876 it was observed that the highest rate of gross revenue was

obtained from high-forest, and the lowest from simple coppice, while coppice under standards occupied an intermediate place. It was also found that in the case of high-forest, the area under coniferous trees yielded a much higher revenue than those under broad-leaved species, chiefly on account of the form of their stems, which enables a very large proportion of sawn timber to be obtained from them, but partly also from the greater value of the thinnings taken from them during the early stages of their growth—in the form, for example, of telegraph and hop-poles, &c. The revenue from forests composed of coniferous and broad-leaved trees mixed together lay between these two. But, of course, this is not an universal rule; for a high-forest of beech might yield a better return than a coppice with oak standards, and a similar comparison might be made between forests stocked with other trees of different relative values, and managed under various systems. The following figures, showing the results of sales in the Nancy conservatorship, will serve to illustrate what has been said:

	Per acre.
Simple coppice.....	yielded.. 4s. 4d.
Coppice under standards.....	do..... 11s. 8d.
High-forest of broad-leaved species.....	do..... 13s. 1d.
High-forest of coniferous and broad-leaved species.....	do..... 23s. 10d.
High-forest of coniferous species.....	do..... 51s. 6d.

Looking, then, at the larger proportion of the communal forests which is under coppice, and at the relatively greater proportion of firewood and timber of small size that they consequently produce, the smaller gross revenue per acre that they were able to yield is no longer surprising. Taking the state and the communal forests together, it was found that their gross revenue was 22 per cent. per acre higher than that of the private forests notwithstanding that these latter are, as a rule, on better soil, and are frequently grown under other more favorable natural conditions.

The average all-round rate actually realized in the state forests per load of wood of all sorts, including tanning bark, was 14s. 5d.; while that obtained in the communal forests was only 9s. 8d. The corresponding rate for the whole of the French forests, including those belonging to private proprietors, was 10s. 7d.; so that the rate of the state forests exceeded the general average by 37 per cent., while that in the communal forests fell to 9 per cent. below it. The revenue obtained by the sale of minor produce was derived principally from shooting leases and permits.

It is not an easy matter to determine the capital value of a forest, but in 1873 an estimate was made, which put that of the state forests at nearly fifty and one-half million pounds sterling, which is equivalent to a little over £50 per acre. The gross revenue derived from them in that year represented a return of 3.15 per cent., but the net profit did not much exceed 2 per cent. on the estimated value. The capital value on the communal forests is certainly less per acre than that of the state forests, on account of the younger age at which the trees are, generally speaking, cut; and, notwithstanding that their revenue is smaller, it is probable that they pay a higher rate of interest than the state forests.

It has been estimated that the relative rates of interest on their capital value paid by forests in which the main crop is removed at various ages, is something like the following, viz.:

	Per cent.		Per cent.
25 years.....	4	60 years.....	2
30 years.....	3½	100 years.....	1
40 years.....	3	200 years.....	½

These figures are intended to give a general idea of the manner in which, notwithstanding the increased value of the produce, the relative rate of interest declines as the age to which the trees are left standing is prolonged. They have no claim to absolute accuracy, even as representing the average of French forests, and still less can they be assumed to apply to the forests of other countries. They serve, however, to explain what has been previously said, viz., that on account of the higher rate of interest which coppice, generally speaking, yields, as well as for other reasons, it is a more suitable system for communes than high-forest; and this remark applies with equal and even greater force to private forests.

RIGHTS OF USER.

The principal rights of user are those relating to timber, firewood, and grazing; but there is also a small number of others, such as those which permit the cutting of turf, the collection of dead leaves, and the like injurious practices. In the state forests the right-holders are, almost without exception, village communities; the instances in which private persons possess rights in them being extremely rare. The communal forests are, comparatively speaking, free from such burdens.

The law of 1827 provided for the investigation and disposal of all claims to exercise rights in the state forests, and barred the acquisition in them of any fresh ones. Hence those only have now to be dealt with which have been formally admitted and recorded in favor of the communities or persons who possess them.

The aim of the department has always been to free the forests from such claims as far as possible, and the law provides for this being done in the following manner, viz., all rights of wood may be commuted by surrendering a portion of the forest itself in lieu of them, the terms being arranged by mutual consent, or, in case of disagreement, by the courts; but the state alone can demand such a commutation, the right-holder cannot do so. Other rights, including those of pasture, cannot be got rid of in the above manner, but the state can buy them out by the payment of a sum of money, the amount of which is either settled by mutual agreement or by the courts. The sale of pasture rights cannot, however, be enforced in places where their exercise is absolutely necessary for the inhabitants, the question of such necessity being, in case of dispute, referred to the *conseil de préfecture*,* subject to an appeal to the *conseil d'état*.† The law also provides that the exercise of all rights, which have not been got rid of in either of the above ways, may be reduced by the forest department with reference to the condition of the forests, and the mean annual production of the material in respect of which they exist; and none can be exercised otherwise than in accordance with the provisions of the law and the rules based on it.

The principal features of the legislation regarding the exercise of wood-rights are the following, viz.: No wood can be taken which has not been formally made over by the forest department; persons who possess a right to dead-fallen wood cannot employ hooks or iron instruments of any sort in its collection; when firewood is made over standing in the forest, it is felled, cut up, and taken out by a contractor, selected and paid by the right-holders, but previously approved by the forest department; the partition of the wood among the inhabitants cannot be made until the work is entirely completed; the contractor is responsible in all respects as if he had been the purchaser of the produce, but he acts under the pecuniary guarantee of the body of right-holders, who cannot barter nor sell the wood made over to them, nor put it to any use other than that for which it is given to them; timber made over in satisfaction of a right, but not used in a period of two years, may be reclaimed by the forest department.

No right can exist to take goats into either the state or the communal forests, as the grazing of these animals is considered incompatible with the maintenance of the ground under wood. The old law suppressed without compensation to the right-holders, the practice of grazing sheep in the forests of the ancient royal domain of France, and the law of 1827 suppressed it also, on payment of compensation, in those state forests which are of more recent origin; but the government has the power to permit sheep-grazing in certain localities as an exceptional and temporary measure. No right to pasture any kind of animals can be exercised in any part of a forest not declared out of danger by the forest department, which has also the power to limit the number of animals to be admitted, and the period during which they may graze, with reference to the condition of the forest and the quantity of grass in it. Right-holders can only pasture animals which they keep for their own use, not those which they keep for sale.

*An administrative tribunal, established in each department of France.

†The central administrative tribunal, established at Paris for hearing appeals from the decisions of the *conseils de préfecture*.

On the 1st of January, 1877, about one-half of the total area of the state forests was burdened with rights of the estimated annual value £38,400, while only 3 per cent. of the communal forests were so burdened, the annual value in their case being estimated at £6,700. The commutation and purchase of rights, which was commenced in a systematic manner in 1857, is effected by the officers of the ordinary service, as well as by those who are charged with the framing of the working plans. As a general rule, the arrangement with the right-holders is made by mutual consent, appeals to the courts being of rare occurrence. The state is in no hurry to spend large sums in the purchase of grazing-rights, which will probably disappear with the progress of agriculture: a result which has already been realized in the north of France, where the greater portion of these rights has lapsed through failure to exercise them.

GRAZING.

Goats, sheep, and cattle have always been the enemies of forests, and they are indeed the principal agents of their destruction, especially in hot and dry climates, where the vegetation is not sufficiently vigorous to resist the effects of over-grazing.

Animals are admitted to the forests under three different conditions, viz. :

- (a) In virtue of a right of user.
- (b) As a means of raising revenue and of utilizing the grass.
- (c) By tolerance, as a temporary arrangement.

Grazing by right.—This has been treated of in the preceding section.

Grazing as a means of revenue and of utilizing the grass.—Neither goats nor sheep are admitted into the state or communal forests with this object. In the state forests it is sometimes the custom to allow cottagers living near the forest to graze their cattle in exchange for a number of days' work, but this is not done to any important extent. In these forests, in fact, very little grazing is sold, for the practice can only be permitted in the unwooded portions, which are rarely available for the purpose, because, although they are of considerable extent (about 450 square miles), they are either required as grazing grounds for the cattle of right-holders or they are being planted up, and hence the revenue from this source is insignificant. It was only £360 during the last year for which the record is available. But it is otherwise in the case of the communal forests, where local custom often necessitates the maintenance as pasture land of blanks, which could otherwise be most advantageously filled up; and some communes derive almost their entire revenue from this source. The receipts by them amounted in the same year to nearly £15,000.

Grazing by tolerance.—It has been said that no right can exist to graze either goats or sheep in the state or communal forests; and the inhabitants of the communes are specially prohibited by law from admitting their own goats and sheep into their forests; but the government has the power to sanction the grazing of sheep (not goats) in certain localities under exceptional circumstances. Permission to drive sheep into the state forests is, however, very rarely accorded, except in seasons of extraordinary drought, when the flocks of the neighboring communes are sometimes admitted for a single season. But in the case of the communal forests, such temporary sanction is, of necessity, more freely accorded, for the forests belong to the inhabitants, and even though their true interests might be better served by keeping out their sheep entirely, it is not found possible to change their pastoral habits all at once; and, on this account, permission has frequently to be granted them to graze their sheep in their forests, either for a single year or for periods up to five years. They can, however, graze their own horned cattle, horses, ponies, donkeys, and pigs there without special permission; and they usually do so on payment of a fee into the communal treasury. According to the latest available record the number of animals of all kinds thus admitted in a single year was as follows, viz. :

Horned cattle, horses, ponies, and donkeys.....	359, 164
Pigs.....	48, 388
Sheep (by special sanction).....	936, 960

The animals can, however, only be grazed in places which have been declared out of danger by the forest officers, and their numbers can be limited with reference to the quantity of grass

available; but it is not always possible to enforce these restrictions rigidly; and the forests, in certain regions, have much to contend with from the extent to which grazing is practiced. The receipts by the communal treasuries on this account have been estimated at 4s. 6d. per head of large cattle, 3s. 11d. per pig, and 1s. per sheep; but this only represents an average revenue of 10d. per acre of the area grazed over, whereas wood yields, on an average, about 8s. 4d. per acre; and it seems probable that this consideration may gradually lead, in the agricultural districts at any rate, to the abandonment of the practice of pasturing cattle on forest lands. There is no doubt that when the grazing, even of large cattle, is permitted, it is carried on at the expense of the crop of wood; and that where it is practiced to any considerable extent the forest, properly so called, tends to disappear; and this is notably the case where, for the time being, local circumstances, such as the absence of export roads, renders wood a less profitable crop than grass. Here the forests gradually become almost unproductive, and finally succumb from excessive grazing.

About four-fifths of the total area of the communal forests are still used as grazing grounds, nearly one-half of the latter being open each year; and the average area provided for each class of animals is about three acres per head of large cattle, two acres per pig, and three-fifths of an acre per sheep. Separate grazing grounds are allotted for each class, and these figures represent the average of all qualities of pasture land; they could not therefore, even supposing that the grazing were not excessive, be taken as a guide to the area which should be provided per head in any particular locality, even in France, and still less so in other countries.

OFFENSES.

Until the year 1859 persons who were charged with offenses against the forest law had always to be tried by the courts; but in that year a law was passed which enabled the forest department to take compensation from offenders instead of bringing them before the tribunals, and this method of dealing with them is now largely practiced. The department has always the power to charge the delinquents before the courts; while they, on the other hand, have always the right to refuse payment of the compensation demanded, and thus to bring about their formal trial. Officers of lower rank than that of conservator are not, however, authorized to deal with cases in this manner, and the power of the conservator is limited to the acceptance, by way of compensation, of sums not exceeding £40; if it is desired to exact a larger amount the sanction of government must be obtained.

This system has many advantages. For while it is necessary in the public interest that infractions of the forest rules should be checked, a large proportion of them are usually of a petty nature, and in many cases the persons who commit them hardly deserve the severer penalties that must be inflicted on their being found guilty by the courts. The system of taking compensation, on the other hand, permits the adoption of a scale of punishment more suited to this class of offenders, while it at the same time enables the means of the delinquents, and the attendant circumstances of each case, to be taken into account. The punishment can also be made to follow promptly the committal of the offense, without the necessity for dragging the accused and the witnesses from their occupations to attend before a tribunal, the time of which is thus not occupied in the trial of these petty cases. The present system is easy and simple for the forest department; and that it acts very leniently on the population living near the forests will be seen, when it is stated that the amount of compensation exacted during the last year for which the record has been prepared, amounted to only one-fifth of the sum which the courts must have awarded had the offenders been proved guilty before them. Occasionally the compensation is allowed to be paid in the form of a number of days' work done in the forest.

With the advancing prosperity of the country, forest offenses become less frequent, and the number committed annually is very much smaller now than it used to be a few years ago. It is worthy of remark that they are more than twice as numerous in the communal as in the state forests, probably because individual inhabitants of the communes think that there is not much

harm in committing minor depredations on property which they doubtless regard as their own. During the year 1876, the number of offenses was 26,377, there being 3 per 1,000 acres in the state forests and 7 per 1,000 acres in those belonging to the communes. More than half of the offenses were connected with the theft of wood or injury to trees, and nearly a quarter related to pasture and cattle trespass, 31,231 persons being involved in the charges. As might be expected, wood-stealing is more prevalent in winter than in summer, while the reverse is the case with regard to breaches of the grazing laws. Of the total number of charges made in 1876, 7 per cent. were abandoned, either owing to the trivial nature of the offenses or owing to want of sufficient evidence; 70 per cent. were dealt with under the compensation law, and the remaining 23 per cent. were taken into court, convictions being obtained in 99 per cent. of these cases.

In addition to clauses dealing directly with wood thefts, illicit grazing, and other fraudulent practices, the forest law provides that no person having cutting instruments in his hand can leave the ordinary roads which pass through the forest, and that no fire can be either lit or carried within, or at a less distance than 200 yards from, any forest boundary. A regular tariff exists which fixes the penalties for damaging trees of various ages and species. The law also prohibits the erection, without permission, of brick-works or lime kilns, carpenters' shops, timber-yards, or saw-mills within certain distances of the forest. At the time that the law was passed, it was much more necessary than it is at present to check the erection of such buildings, and applications for permission to construct them are now usually accorded on suitable conditions.

INJURIES CAUSED BY WILD ANIMALS AND INSECTS, STORMS AND FIRES.

Wild animals and insects.—The principal wild animals which cause injury to forests, either by devouring the seed or the young seedlings, or by peeling the bark off the young plants, are deer, pigs, hares, and rabbits. The insects which attack the leaves, the bark, and even the wood of trees, belong chiefly to the families *Coleoptera*, *Lepidoptera*, and *Hymenoptera*. But the damage done is not excessive, and it is, in fact, far less than that produced by the same causes in many other countries. It is of course exceedingly difficult to put a money value upon injuries of this sort, which include not only the actual death of a certain number of old and young trees, but also a reduction in the growth of others. An estimate was, however, made regarding the damage done in 1876, and it is said to have amounted to about 4s. per 100 acres, taken on the entire area of the state and communal forests. The coniferous trees generally suffer more than the broad-leaved species, as they are more exposed to the attacks of insects, which do not infrequently kill them outright, whereas the latter species more often suffer merely a diminution in their rate of increase.

Storms.—The damage done by storms of wind is a much more serious matter. Injuries are caused to the forest by them, which it is not always possible either to prevent or even to modify. In the first place, the windfalls interfere with the arrangements laid down in the working plan, and the considerations which guide the execution of felling are thus thrown out; they remove too large a proportion of the seed-bearing trees and consequently it is sometimes necessary to substitute a difficult and artificial process for the natural regeneration, which would otherwise have been effected; while, in addition to this, they break or otherwise damage, neighboring trees by their fall. In the second place, the value of the windfalls themselves is, speaking generally, small, as they are frequently broken or otherwise injured, while most of them have probably not attained the age or dimensions at which it was intended that they should be felled. They are also specially liable to attacks by insects, which often appear in large numbers in forests where many trees have been blown down, particularly in case of the coniferous species. Even uninjured windfalls fetch a lower price than trees felled in the regular manner, because they are usually found scattered here and there, instead of being concentrated in one part of the forest.

The year 1876, which is the last for which figures can be obtained, was a disastrous one, the amount of windfall being exceptionally large, probably double of that which occurs dur-

ing an average year. The number was put at 1,145,708 trees, and the damage caused was estimated at £10,300, or about £3 4s. per 100 acres in the state forests, and 12s. per 100 acres in those belonging to village communities. The latter being, for the most part, coppice under standards, suffered less than the former, while the proportion of windfalls in the coniferous forests was greater than that in those composed of broad-leaved species. The windfalls were sold for nearly £621,000.

The forest officers, when arranging the annual felling, are careful to provide, as far as possible, against the effect of storms, by leaving a protecting belt of trees standing on the side of the forest from which the dangerous winds blow, and in other ways; but much depends on natural conditions which are beyond their control, such as the configuration of the ground, the shelter afforded by neighboring hills, the nature of the soil and its physical condition, the kinds of trees and their root development, as well as their size, age, and the system of treatment to which they have been subjected.

It may be added that hailstorms often do great damage by stripping the trees of their foliage, and by breaking or otherwise injuring the young plants.

Fires.—The penal code provides for the punishment of persons who cause forest fires either intentionally or through carelessness; and the forest law prohibits the lighting or carrying of fire either inside the forests or within 200 yards of their boundaries; but the ordinary laws do not prevent proprietors from lighting fires in their own forests to the danger of their neighbor's property. This is an important question in the Maures and Esterel,* where the bad practice is followed of systematically lighting fires in the forests, in order to burn up the heather and other shrubs which interfere with the regeneration of the crop of trees; and in 1870 a special law was passed prohibiting the proprietors of those districts from lighting fires in their forests, except at seasons fixed by the prefect; and also compelling them to clear fire-lines around all woods and forests which have not been completely freed from all inflammable shrubs.

In 1876 there were 290 fires in the area managed by the forest department, nearly all of them being the result of accident. The surface burnt over measured 2,350 acres, or about $\frac{1}{3000}$ part of the entire area, and the damage was estimated at £3,280, or 28s. per acre of forest burnt. The proportion of fires was greater in the broad-leaved than in the coniferous forests; but, on the other hand, the amount of damage done per acre in the latter was three times as great as in the former, the resin in the trees themselves and in the dead needles on the ground rendering the fir and pine forests excessively inflammable. It is also worthy of remark that, although as a general rule, fires were of more frequent occurrence in the spring than at any other season of the year, the autumn fires were, on account of the recently fallen leaves, by far the most destructive. But this is by no means true of all regions, and the general result may be mainly ascribed to the great damage done by fires occurring during the autumn in the south of France. In the north forest fires are of small importance, and occasion little damage.

HUNTING AND SHOOTING.

The right to hunt and shoot in the state forests is, generally speaking, let out on nine years' leases, which are sold by public auction under the rules for the sale of timber and other forest produce; but when this is not possible, it is sold by means of annual permits issued under the direct authority of the minister of agriculture, the sport being always carried on under the surveillance of the officers of the forest department. No forest officer can become a lessee of the shooting within the limits of his own charge, and forest guards are never permitted to shoot in the forests under any circumstances.

The municipal councils are, subject to the approval of the prefect, free to dispose of the right to hunt or shoot in their forests in any manner that they wish.

* Low mountain ranges in the south of France.

DESTRUCTION OF WOLVES.

The destruction of wolves, boars, and other animals which are considered dangerous or harmful, is intrusted to a corps of 410 *lieutenants de l'ouvèterie* (wolf-hunters). These officers who are unpaid, but have the right to wear a handsome uniform, are under the control of the conservator of forests, and are appointed by the prefect on his recommendation. They are, as a rule, landed proprietors, who accept their appointment for the sake of the sport it affords them. They are obliged to keep blood hounds and packs of dogs, and are charged to organize and direct, in communication with the local forest officers, the *battues* which are, from time to time, ordered to take place in the forests. But as this system has not been found a very efficient one, a law has recently been passed under which a reward, varying from £1, 12s. to £7, is payable to any one who kills a wolf; and the mayors are authorized, when the snow is on the ground, to organize *battues* for the destruction of wolves, boars, and other animals, anywhere within the limits of their respective communes, on condition only that they give due notice to the proprietors of the land on which the beat is to take place. The rewards paid for killing wolves amount to about £4,000 a year.

CHAPTER III.

AFFORESTATION WORKS—WORKS UNDERTAKEN FOR THE CONSOLIDATION AND PROTECTION OF UNSTABLE MOUNTAIN SLOPES.

Excessive grazing, both by local herds and flocks, principally of sheep and goats, as well as by vast numbers of these animals which are annually driven up from the plains to the hill pastures, have produced complete denudation over very large areas; and have thus caused incalculable damage in the great mountain regions of France, principally in the southern Alps, and in the level country below them. They eat down the grass to the level of the ground, and then tear out the very roots, breaking up the surface of the soil, and rendering it liable to be washed down by the rain. These hills are of a loose formation, the strata being contorted and dislocated to a remarkable degree, and as soon as the soil is deprived of its protective covering of trees, shrubs, and herbs, whose roots hold it together, the slipping and falling of the mountain sides are produced with a constantly increasing intensity. The rain water, no longer interrupted in its fall, retained by the spongy, vegetable mould, nor hindered in its downward flow by the thousands of obstacles which a living covering would oppose to its progress, flows off the surface of the ground with extraordinary rapidity, and, carrying with it large quantities of loose soil, suddenly fills up the torrent beds. These latter, scoured out by the rush of water, charged with mud, stones, and rocks, cut their way deeper and deeper into the mountains; and their banks, deprived of their support at the base, fall inward, the *débris* being borne onward to the level ground below. The cracks and slips occasioned in this manner extend to a great distance on either side of the torrent, especially on the side on which the strata slopes toward it, and the effect is much increased when the upper layer of rock is loose, and lies upon an impermeable bed; the water then saturates the loose rock, and, penetrating through it, and through the cracks and fissures, flows over the hard surface, the superincumbent mass being precipitated, either suddenly or by slow degrees, into the valley below. The same effect is produced in the whole net-work of water courses, both principal and tributary, which traverse the mountain sides; the upper strata over enormous areas, with fields, houses, and even entire villages, being carried down into the valleys, and the whole region, which presents little to the eye but a series of unstable slopes of black marl, has an indescribably desolate appearance. It may be added that when the hillsides are covered with trees, the snow, which has accumulated during the winter months, disappears gradually under the influence of the milder temperature which accompanies the advancing spring; but when the trees have been removed, and the masses of snow are consequently exposed to the full force of the sun's rays, they melt rapidly, and produce results on the mountain sides similar to those which follow the occurrence of heavy storms of rain.

But the damage does not stop here, for on reaching the comparatively level valleys which form the main lines of drainage of the mountain range, the stones, gravel, and sand transported by the numerous torrents are deposited. These valleys being usually very fertile are occupied by fields, villages, and towns, which are connected by roads and sometimes by railways, constructed with many bridges, retaining walls, and other masonry-works; and as, by degrees, enormous areas become covered with *debris*—sometimes this result is produced suddenly and without warning—the buildings are either thrown down or overwhelmed, the railways and roads are blocked, and the bridges are overthrown, while the fields are completely and irretrievably destroyed. The damage thus caused is most serious, both in its nature and extent; and to it must be added the great inconvenience and loss occasioned by the interruption of traffic on the roads and railways. But this is not all. If the *debris* transported by the torrent is carried into the river before it can be deposited, it is either borne on at once and thrown on to the level country lower down or it remains and turns the course of the stream over the fields and buildings on its opposite bank. Occasionally the deposit temporarily blocks up the valley and causes the inundation of villages and fields on the upper side of the barrier; and when this latter ultimately gives way, the most disastrous results ensue, both in the lower part of the valley, and in the open country at the foot of the mountain range. It is to mitigate these terrible evils that the vast enterprise of afforesting the mountains has been undertaken as the only means of dealing with them. But, owing to the enormous cost of the works, it cannot be hoped that the forests thus raised will ever prove directly remunerative, and their creation, with a view to their ever becoming so, could not for a moment be justified.

The works are of two classes, viz.: Firstly. The treatment of the torrent beds by a series of weirs and other structures, destined to bring them gradually and by successive stages to a normal slope, and thus not only prevent "scour," but, by the filling up and widening of the beds behind the weirs, to afford support to the unstable sloping sides, and thus gradually to consolidate them with a view to their being ultimately planted up. Secondly. The immediate planting up of all areas, the surface of which does not seem likely to be washed down within the period occupied by the construction in that locality of the first class of works. A commencement was made in 1860; but the law passed in that year not having been found sufficient, a new law came into force in 1882, which provides both for the works to be undertaken directly by the state, and for those to be executed by the proprietors of the ground, with or without state aid, as well as for simple measures of prevention.

Works undertaken by the state.—The proposal to take up ground for this purpose emanates from the forest department, and is followed by a formal inquiry, under the direction of the prefect, into the circumstances of the case, regarding which a special commission, with a forest officer as one of its members, makes a report. If the proposal is approved, a law is passed declaring the work to be one of public utility, and under it the ground with all existing rights, either of the proprietor or other persons in it, is bought by the state, either by mutual agreement or by expropriation. The area is then under the forest law, and the works are undertaken at the public cost.

Works undertaken by the proprietors.—If, however, the proprietors, who are for the most part village communities, do not desire to part with the land, they must, before the expropriation has been ordered, agree to execute the specified works themselves, within a fixed time, and to maintain them, under the control of the forest department. In some cases, but not always, pecuniary aid is then afforded to them. If the proprietors of land outside the areas which are taken up for treatment as works of public utility, desire to undertake measures for the consolidation of the soil, or for the improvement of their pastures, they can obtain assistance from the state in the way of money, seeds, plants, or of work done for them; but when any such aid is afforded, the operations are under the surveillance of the forest department, and in certain cases the money so advanced has to be refunded.

Preventive measures.—When the condition of the ground is not such as to warrant its being dealt with in the above manner, it may, after the same preliminary formalities as before, be

closed against grazing for any period not exceeding ten years, in which case compensation is paid annually to the proprietors for their loss of the use of it. During this interval the state has the power to execute works, in order to promote the more rapid consolidation of the soil, but the nature of the property cannot be changed thereby, and the proprietor cannot be called upon to pay anything for the improvement thus effected; while if, after the lapse of ten years, it is found necessary to continue the exclusion of cattle, the state must buy the land, either by mutual agreement or by expropriation.

But none of the measures above described would deal effectually with the situation unless the source of the evil were at the same time attacked, by bringing the pastoral arrangements on the neighboring hills under control, so as to avoid overgrazing; and the law therefore provides that in 313 village communities, all those in which works are undertaken being included, as well as many others, the grazing must be carried out in the manner approved by the forest department. The communes are therefore obliged to submit to the prefect annual proposals on this subject, showing the nature and extent of their pasture lands, the portions that they propose to use during the year, the number of animals of each kind that are to graze, the roads by which they are to reach and return from the pastures, and other matters. These proposals are considered by the forest department, and modified if necessary. In addition to this, with a view to encourage the pastoral population of the mountains to take care of their grazing grounds, and to put a stop to abuses resulting from ignorance and from the continuance of injurious customs, the forest department is empowered to grant money rewards to *fruitières* (associations of cattle-owners for the manufacture of cheeses) for improvement made by them to their pastures. It is also desired to encourage, as far as possible, the substitution of cows for sheep; but the population of the mountains does not like the afforestation of their grazing grounds, and the principal reason for the offer of rewards by the state is that it is considered politic to do something to aid them in their industry, as some set-off against the inconvenience to which individual communities are sometimes put by these operations.

Scope and progress of the entire work.—The total surface to be treated as a work of public utility in the Alps, Pyrenees, and Cevennes, is estimated to amount to 1,035 square miles, in addition to about 1,900 linear miles of torrent beds. Up to the end of 1885, 152 square miles of this surface and 373 miles of torrent beds had been completed; the expenditure having amounted to £819,320, and the rates having varied from £3, 2s. to £6, 3s. 6d. per acre, and from 2s. to 7s. 6d. per linear yard of torrent bed. There remain to be treated, therefore, about 883 square miles of surface, and 1,500 miles of torrent beds. In addition to the above, the state has paid £138,000, or half the cost of treating 212 square miles, as "permissive works," under the old law, and £12,000 toward pastoral improvements.

DRAINING AND PLANTING OF SWAMPS AND WASTE LANDS.

Measures of the nature above described for the consolidation and protection of mountain slopes are undertaken in the interest of the population generally. In the case of sterile unproductive wastes or swamps, not requiring to be dealt with on these grounds, the government has thought it better, as a general rule, to leave each proprietor free to do what he considers most to his own advantage, confining it to the exemption from taxes for thirty years of all lands planted up. But the state has the right to force the communes to drain their swamps and wastes, with a view to rendering them suitable either for cultivation or for the growth of trees; and when this is done, advances of funds may be made under certain conditions, one of which is that the commune has the right to surrender to the state, in satisfaction of all claims, a portion of the area not exceeding one-half.

THE DUNES OF THE WEST COAST.

The winds that blow continually from the ocean on to the west coast, carry with them enormous quantities of sand, which, advancing steadily over the country at the rate of some 14 feet per annum, in the form of moving hills called dunes, bury under them the fields and vil-

lages they reach. It has been calculated that nearly 90 cubic yards of sand per yard of coast line are thus annually transported inland. Works to arrest the destructive effects of this invasion of sand have been in progress since 1789; they were originally carried out under the department of public works, but since 1862 they have been placed under the forest department. The total area of the dunes is said to be 224,154 acres, a part of which belongs to the state, and a part to private owners, while a much smaller portion is communal property.

In exposed situations the protective works consist of a wooden palisade, erected at a short distance above high-water mark, and destined to promote the formation of an artificial dune, with a view to prevent fresh arrivals of sand from being blown over the country. Under its shelter seeds of various kinds, principally those of the maritime pine (*pinus maritima*), broom, gorse, and goubet (*arundo arenaria*), are sown; the seeds being covered with brushwood to prevent the sand in which they are sown from moving; and the sowing is thus continued inland, in successive belts, until a crop of trees is raised on the entire area. In less exposed situations a wattled fence is substituted for the wooden palisades. In the departments of Gironde and Landes, forests of the maritime pine have been most successfully raised in this manner, the trees being tapped for resin, and the wood of those which have been exhausted being sold for railway sleepers and other purposes. But north of the Loire the maritime pine is not sown, as in that region it does not yield a sufficient quantity of resin to repay the cost of its introduction, and here it is sought merely to establish a crop of grass on the ground.

The law of 1810, relative to the treatment of the dunes, which is still in force, provides that the government can order the planting up of any area which in the public interest requires to be so dealt with. When the land or any part of it, belongs to communes or private proprietors, who cannot or do not wish to undertake the work, the state can execute it, reimbursing itself, with interest, from the subsequent yield of the forests. As soon as the money so advanced has been recovered, the land is restored to the proprietors, who are bound to maintain the works in good condition, and not to fell any trees without sanction of the forest department. This system of raising forests on private lands would not be likely to succeed elsewhere; but here the extremely profitable cultivation of the maritime pine, due to the large quantity of valuable resin that it yields in the hot and moist climate of the southwest littoral coast, renders it a safe transaction for the state to engage in.

Before the forest department took over the work in 1862, 111,787 acres had been dealt with; and the entire area has now been completed. The works have to be most scrupulously maintained, in order to prevent a recurrence of the evil.

CHAPTER IV.

ADMINISTRATIVE ORGANIZATION AND DEPARTMENT STAFF—ADMINISTRATIVE ORGANIZATION.

In order to carry out the work which has been briefly described in the preceding chapters, a corps of professional foresters, composed as follows, is maintained, viz.:

1	Director of the Forest Department.	} Superior Staff.
9	Inspectors general.	
39	Conservators.	
245	Inspectors.	
234	Assistant-inspectors.	
308	Sub-assistant Inspectors (<i>Gardes généraux</i>).	} Subordinate Staff.
3532	<i>Brigadiers</i> (Head Guards) and Guards.	

This body of officials is employed, partly in the ordinary duties of the department, as being in administrative, executive, or protective charge of the units into which the forests (including those of Algeria) are grouped, for their more efficient and convenient control; partly in special branches, such as those which are charged with the preparation of working plans, with the treatment of unstable mountains, and with the communal grazing arrangements; and partly also in the central offices at Paris. The following statement shows the number of officers of the superior staff employed on each kind of duty:

	Director.	Inspectors - General.	Conservators.	Inspectors.	Assistant inspectors.	Sub-assistant inspectors.	Total.
Central offices.....	1	8		10	12	2	33
Ordinary duties.....			35	180	177	209	601
Working-plans branch.....				15	14	6	35
Consolidation of mountain slopes.....				15	12	49	76
Communal grazing.....				2	2	1	5
Schools.....		1		3	6		11 *
Algeria.....			1	17	10	37	67
Detached duty.....				3	1	4	8
Total on active list.....	1	9	39	245	234	308	836

The central offices at Paris.—Since 1877 the forest department has been under the minister of agriculture, instead of, as formerly, under the minister of finance. And the change has proved a most beneficial one; for the forests are now regarded more from the point of view of their utility in augmenting the general prosperity of the country, than from that of the money revenue they can be made to yield; and they are no longer looked upon as available for sale whenever the low state of the exchequer may seem to suggest this course, which was not seldom in olden days. •The minister of agriculture is the president, and the director of the forest department is the vice-president, of a council of administration formed by the eight inspectors-general, which considers all questions submitted for the orders of government. The central office is divided into seven sections, each of which deals with certain branches of the work, and is presided over by an inspector-in-charge, who is assisted by two or three other forest officers and a number of clerks.

Ordinary duties in the forests.—The unit of administrative charge is the division (*inspection*) which is held by an inspector; but for purposes of executive management this charge is split up into subdivisions (*cantonments*), under assistant or sub-assistant inspectors, who are also at the disposal of the inspector for any special work that he may require of them. Occasionally, when the division is a small one, the inspector himself holds charge of a subdivision. The divisions are grouped into conservatorships, and these again into six circles (*régions*), each of the latter being assigned to an inspector-general. The forests, state and communal, managed by the forest department are 11,508 square miles in extent, and they are divided into 414 subdivisions, 192 divisions, and 35 conservatorships; consequently, the average area of each of these charges is as follows, viz.: Subdivision, 28 square miles; division, 60 square miles; conservatorship, 329 square miles. The average area of an inspector-general's circle extends over 1,918 square miles.

The subdivisional officer is essentially an out-of-doors man, who personally directs all work going on within the limits of his charge, in accordance with the instructions given to him by the inspector, whose assistant he is, and who can at his discretion employ him on special duties

* Exclusive of two forest officers who have been removed from the active list as professors, and three professors who are not forest officers.

outside his subdivision. The divisional officer is the manager of the forest estates. He prepares projects for the various works that are to be undertaken, and directs the subordinate officers in their execution; he is also the prosecutor in all cases taken into court for the suppression of forest offenses. The conservator exercises a general control over the divisional officers employed under him; and it is his duty to see that all work is directed in accordance with the views of the government, as they are from time to time communicated to him from the central office. He alone has control of the expenditure, and has power to issue orders on the public treasury. As regards his circle, the inspector-general is not an administrative officer, but he makes an annual tour, and is required to become personally acquainted with all the work going on, and with the qualifications of all ranks of officers employed within it, seeing that each fulfills his duties properly. During the remainder of the year he is at headquarters, where he is able to make use at the council board of the information collected during his tour, by advising the government both in the issue of orders for works and in the selection of officers and subordinates for promotion to fill the vacancies that may occur.

It may here be mentioned that in addition to the charge of the state and communal forests, the officers of the department are called upon to exercise certain functions in the private forests, which will be explained hereafter.

Working plans.—A separate branch of the department is charged with the framing of working plans for the most important forests, those for the smaller ones being prepared by the local officers. The thirty-five inspectors, assistant and sub-assistant inspectors, who are thus employed, are divided into nineteen sections, which are at present working in twenty-four conservatorships. As the operations are concluded in one locality, the sections are moved to another. The officers are under the orders of the local conservator, who transmits their proposals to headquarters with his own opinions and recommendations.

Consolidation of mountain slopes.—The branch of the department to which this vast undertaking is intrusted is presided over by an inspector-general, and is composed of seventy-six officers of the superior staff, working in eighteen centers. These officers are under the orders of the conservator within whose charge they are employed; and he transmits their projects and proposals to the inspector-general, who is thus enabled, by the exercise of his supervision, to utilize the experiences gained in the various localities for the benefit of the entire work. The inspector-general reports to the director of the department all matters relating to this undertaking which are to be laid before the council of administration.

Communal grazing arrangements.—The five officers who are employed in the three great mountain regions to prepare projects for the control of the communal grazing arrangements and the issue of rewards for improvements to the pastures effected by the *fruitières* (associations for cheese-making), are placed in the same relation to the conservators as are the officers employed on the consolidation of mountain slopes.

Accounts.—It is a fundamental principle of the French system of forest administration that the forest officers have nothing to do with either the receipt or the payment of money. They sell the produce by auction, or by the granting of permits, as the case may be; but the sums realized on account of such sales are paid by the purchasers directly into the public or communal treasury. The inspector prepares a budget estimate for his proposed expenditure on works; and when this has been sanctioned, the various undertakings are commenced. Towards the end of each month he submits to the conservator an estimate of his proposed expenditure for the following month during the last days of which that sum is paid to him, and he disburses it at once, transmitting the vouchers, together with the unexpended balance, should there be any, to the treasurer-general; he keeps no money in his hands. In exceptional cases, however, the conservator can grant orders for advances to the officers employed under him; but in this case they must, at the end of each month, adjust the advance by vouchers handed in to the treasurer-general, along with any balance of cash that may remain unexpended in their hands. The treasurer-general thus keeps all the accounts, both of receipts and expenditure, of the department.

DEPARTMENTAL STAFF.

Members of the forest department are ineligible for any other office, either administrative or judicial; they are prohibited from engaging in trade, or in any industry connected with wood, and they must be regularly sworn in before they can enter upon the exercise of their functions. They have, as regards forest offenses, the powers of police, including the right to make domiciliary visits for purposes of investigation and to arrest suspected persons; but these powers are exercised chiefly by the members of the subordinate staff. Officers of the superior staff act as public prosecutors in forest cases.

Superior staff.—Candidates for the superior staff are, as a rule, trained at the national forest school at Nancy; but one-third of the appointments to the lowest grade (*Garde général*) are reserved for the promotion of deserving subordinates. A young forest officer, on leaving the school, is employed for a time, usually about a year, in learning his duties under an inspector; and his advancement from this probationary stage, as well as his further promotion through the higher grades, depends on his own qualifications and exertions, as reported by his immediate superiors.

A promotion list is drawn out every year by the council of administration, and published for general information. On it are inscribed the names of those officers of each grade who are considered to be the most deserving of immediate promotion, the number of names on the list being limited to three times the number of the anticipated vacancies. The minister of agriculture makes all promotions up to and including the grade of inspector, but the conservators, the inspectors-general, and the director of the department are nominated by the president of the republic. No officer can, however, be selected for promotion whose name is not found on the list and who has not served at least two years in the lower grade.

The yearly pay of the various grades is as follows :

Director of the forest department.....	£800
Inspectors-general, 3 classes.....	£480 to £600
Conservators, 4 classes.....	£320 to £480
Inspectors, 4 classes.....	£160 to £240
Assistant inspectors, 3 classes.....	£120 to £152
Sub-assistant-inspectors, 3 classes.....	£80 to £104
Sub-assistant-inspectors on probation.....	£60

In addition to their salaries, the officers receive traveling allowances, usually a fixed sum per annum, at various rates according to local circumstances.

A pension, at a rate which varies according to the grade of the retiring officer, is obtainable after the age of 60 years; but no inspector can become a conservator after he has passed the age of 55 years. Conservators are usually pensioned at the age of 62, and inspectors-general at 65.

Subordinate Staff.—All members of the subordinate staff must have served in the army, and, as a general rule, they must have attained the rank of non-commissioned officer; they cannot be less than 25, or more than 35 years of age at the time of their appointment. They receive their first nomination from the minister of agriculture, who promotes them from a list similar to that which is annually prepared for the superior staff. The scale of annual salaries is as follows, viz. : Head guard, three classes, £36 to £44; guard, two classes, £28 and £30, with an additional £2 after fifteen years' service.

They must live in or near the forests, where they are provided, as far as possible, with accommodations for themselves and their families in houses specially built for them; but if such houses are not available, they receive a lodging allowance. In addition to their pay, they are given a fixed quantity of firewood per annum, and they are allowed to cultivate a plot of ground not exceeding $2\frac{1}{2}$ acres, and to graze two cows in the forest.

Each guard has a beat which he is bound to visit daily, the average size of such charge being about 1,200 to 1,300 acres, or say two square miles. The head guard has four or five guards under his orders; he superintends their work, and communicates to them the instruc-

tions received by him from the subdivisional officer. The duties of the subordinate staff are chiefly those of protection; they act as forest police, and have the power to serve summonses, as well as to arrest delinquents. They are bound to report all offenses committed within their beat; and should they fail to do so, they become responsible for the payment of any fines or compensation money which might be levied from the offenders. Acting under the orders of the subdivisional officer, they superintend all work going on within the limits of their charge; and in addition to this, they, under his direction, tend the young plants, prune the stems of the reserved trees, fill up small blanks in the forest, and perform such like minor operations with their own hands. Rewards are given annually to men who have specially exerted themselves in this manner; but they are forbidden to accept, without special sanction, any gratuity from "communes" or private proprietors for services rendered by them in the execution of their duties. They are entitled to a pension when they have attained the age of 55 years, and have completed twenty-five years' service, including the time spent in the army.

As above stated, one-third of the appointments to the grade of sub-assistant inspector are reserved for the promotion of deserving members of the subordinate staff. Ordinarily men so promoted must have at least fifteen years' service, and be less than 50 years of age; but they can be promoted after four years' service, if they have passed successfully through the secondary school at Barres.

Military Organisation.—Under the law which provides that all men belonging, in time of peace, to regularly organized public services, can, in time of war, be formed into special corps, destined to serve with the active or with the territorial army, the members of the forest department form a part of the military forces of the country; and the officers of the superior and the subordinate staff are organized by conservatorships into companies or sections, according to their numerical strength. In case of the mobilization of the army, the forest corps is at the disposal of the war minister, and its various units assemble at previously determined points. The students of the forest school at Nancy receive military instruction and are drilled, the time passed at the school counting as service with the colors. The officers of the superior staff hold rank as officers of the reserve, or of the territorial army, and in time of war may be employed either in command of the companies and sections of the forest corps, or otherwise as may be ordered. From the day that they are called out, the companies form an integral part of the army, and enjoy the same rights, honors, and rewards as the other troops which compose it. They are inspected by their own officers annually in time of peace, and the head-guards and guards, who form the non-commissioned officers and rank and file of the companies, enjoy at all times certain privileges as soldiers.

In virtue of this service, a military uniform is prescribed for all grades, including the students at the schools. The subordinates wear it always; and the officers do so on all ceremonial occasions, including official inspections of the forests by their superiors.

CHAPTER V.

FOREST SCHOOLS—THE HIGHER SCHOOL AT NANCY.

The forest school at Nancy is the only one existing in France for the training of officers of the superior staff. It was founded in 1824, before which year the department was recruited either by means of young men, often of good family, who worked gratuitously in the inspectors' offices in the hope of ultimately obtaining an appointment, or by means of retired officers of the army. Very few forest officers received, under the old system, a professional training sufficient to enable them to discharge their duties satisfactorily; and it was to remedy this state of things that the school was established. The arrangements were modest at first; but a great development has taken place during the sixty-two years that have elapsed since 1824. The present organization of the school will now be briefly described.

The controlling and teaching staff is composed as follows, viz. :

1 Director, with the rank of inspector-general (professor of political economy and forest statistics).

- 1 Deputy-director (professor of forestry).
- 1 Assistant-professor of forestry.
- 1 Inspector of studies (professor of law).
- 1 Assistant-professor of law.
- 1 Professor of natural history.
- 1 Assistant-professor of natural history.
- 1 Professor of applied mathematics.
- 1 Assistant-professor of applied mathematics.
- 1 Professor of agriculture.
- 1 Professor of German.
- 1 Professor of military science.
- 1 Assistant-inspector for experiments.

All these are forest officers except the professors of agriculture, German, and military science; and none of them, except the professor of agriculture, who is dean of the faculty of science at Nancy, have any other duties. The salary of the director rises from £360 to £480, with £80 a year sumptuary allowance. The professors of forestry, natural history, law, and applied mathematics receive, on first appointment, £80 a year in addition to the pay of their grade, whatever it may be; but if, after some years, they desire to be permanently attached to the school, they may be removed from the active list, on a salary rising from £280 to £360 a year, when they are entitled to a higher rate of pension than they would otherwise receive. The assistants take part in the instruction under the control and guidance of professors, whom they are in training to succeed; they receive £40 a year in addition to the pay of their grade. The salaries of the professors of agriculture, German, and military science are fixed from time to time, the maximum rate being £240. The appointments of deputy-director and inspector of studies do not entitle their holders to any extra pay; but these officers, as well as the director, have free quarters at the school. The staff is completed with an accountant, two adjutants (corresponding to sergeant-majors), a librarian, a gate-keeper, and other subordinates.

The director of the school is the president, and the professors and assistants are the members of a council of instruction, which assembles at the school from time to time to consider any matter which may be brought before it by the director.

A council sits at Paris at least once a year for the consideration of such general questions as may be brought before it, relative both to the instruction given at the forest schools of Nancy and Barres, and the conditions of admission to, and the regulations in force at, those institutions. President, the minister of agriculture. Members: A senator, a member of the *conseil d'état*,* the director of the forest department, the director of agriculture, the director of agricultural hydraulics, an inspector-general of forests, the directors of the forest schools at Nancy and Barres, a conservator of forests, a retired forest officer, the director of the agronomic institute, a member of the national agricultural society, an inspector-general of mines, a chief engineer of naval construction, the professor of surveying from the military school, and an officer of the army.

Admission to the school is obtained by public competition. Candidates must be between the ages of 18 and 22 years; they must be in sound health, and hold a certificate showing that they have completed their course of general studies at the *lycée* (high school). The subjects in which they are required to pass at the entrance examination are as follows, viz. : Arithmetic, elementary geometry, algebra, trigonometry, analytical geometry, descriptive geometry; natural philosophy, organic and inorganic chemistry, cosmography, mechanics, the German language, history, physical and political geography, and plan-drawing. Two passed students from the agronomic institute, and two from the polytechnic school, can, if otherwise

* See foot note, page 291.

qualified, be admitted every year without further examination. The number of candidates admitted annually is, as a general rule, from fifteen to eighteen, and the course of study extends over two years, so that there are from about thirty to thirty-six regular students at the school at one time. The young men while at Nancy are housed in the school building, but take their meals in the town. Their parents deposit £50 a year for their maintenance, including the purchase of books and instruments; but they do not pay anything for their instruction, or toward the annual expenses of the school, which may be estimated as follows, viz.:

Salaries, scholarships, tours, and examinations.....	£4,170
Maintenance of the buildings, library, museum, etc.....	742
Total annual payments by government.....	£4,912

If the number of students passed annually through the school be taken as sixteen and a half, the actual expenditure per head, for the entire period of two years' residence, is £298; but if interest at 4 per cent. on the estimated capital value of the buildings and collections (£22,000) be added, the annual expenditure becomes £5,702, and the amount spent by the state on each student during the period of his training is raised to about £350.

Each year of study at the school comprises six and a half months of theoretical, and two and a half months of practical, instruction; one month being devoted to examinations, and there being two months of vacation. During the period devoted to theoretical instruction the following subjects are taught, viz.: First year—Sylviculture in all its branches; botany, including vegetable anatomy and physiology, as well as the classification of plants and their geographical distribution, special attention being paid to forest trees and shrubs; political economy, with special reference to forests; forest statistics; law, including forest laws and rules, together with such general knowledge of the common law of the country as is judged necessary; surveying and the construction of roads; the German language; military science; riding. Second year—Working plans or schemes of forest management; mineralogy and geology, with special reference to the chemical and physical properties of forest soils; zoölogy, especially the branch relating to the insects which attack trees; agriculture; buildings, including houses, saw-mills, and bridges; the treatment of torrent beds, including the construction of masonry and other weirs. The teaching of surveying, law, the German language, military science, and riding is continued. During the last month of each theoretical course weekly excursions are made into the forests, but with the exception of this and the riding-drill the whole of the instruction is given in the class-rooms.

The practical course, which occupies two and a half months of each year, or five months in all, consists of tours made into the forests in the neighborhood of Nancy, as well as into those of the Vosges and Jura, and occasionally to other localities, for the purpose of studying forestry, natural history, and surveying, a part of the time being devoted to military exercises. An area of 7,500 acres of forest, situated near Nancy and placed under the director of the school, is used as a field of practical instruction, as well as for various experiments and researches, to carry out which an assistant-inspector is attached to the staff. The subjects dealt with by him are principally meteorology, the growing of plants in nurseries, various methods of pruning, the effects of different systems of thinning, the rate of growth of various kinds of trees living under different conditions, and many other things.

The school is well equipped in every way. Besides commodious buildings to accommodate the director, the deputy-director, the inspector of studies, the students, the adjutants, and other subordinates, there is a spacious amphitheater, with halls of study; a recreation-room and an infirmary are also provided. The museum contains very complete collections, illustrating the courses of mineralogy, geology, palæontology and botany, with woods, fruits, seeds, and carefully arranged dried specimens of the foliage and flowers of trees and other plants, as well as raw forest products. There are also stuffed mammals, birds, reptiles, and fish, and a collection of insects, with sections of wood showing the damage done by them to the trees. The school possesses an excellent professional library, comprising about 3,350 volumes and a number of maps. It has also a chemical laboratory, in which many interesting researches are made,

either at the instance of the professors or of forest officers of the ordinary service who may desire the investigation of questions which have arisen in the course of their work. There is a collection of models of saw-mills, of torrent beds treated with weirs, and of sand dunes, &c., as well as a fencing-hall and a botanical garden. It is estimated that the buildings are worth about £12,000 and that the library and other collections are worth £10,000; total, £22,000.

The students having passed out of the school at the end of their course of instruction, are appointed to the forest department as *Gardes généraux* (sub-assistant inspectors), and are employed on special duty for a time before being intrusted with the charge of a subdivision.

Both Frenchmen and foreigners can obtain permission to follow the courses of the school as "free students" without the payment of any fees. Since the foundation of the school in 1824, 1334 regular students, candidates for the French forest service, have been received; and complete or partial training has been afforded to 239 free students, of whom 30 were Frenchmen, 73 Englishmen, and the remainder were foreigners of other countries.

The Englishmen are sent by the secretary of state for India, to be trained for the Indian service, under a special arrangement made with the French government. Ordinarily the free students merely attend the lectures, and, as a matter of course, are not examined; but the English students have to pass all the school examinations.

THE SECONDARY AND PRIMARY SCHOOLS AT BARRES.

The secondary school was established in 1883, in order to train a class of men who should occupy an intermediate position between the officers of the superior and those of the subordinate staff. Of the students who entered in that year, seventeen passed out as head-guards, and one of these has been promoted to the superior staff as a sub-assistant inspector. But the school was reorganized in 1884, and it is now maintained in order to facilitate the entrance of subordinates into the superior staff, by completing the education of such of them as may be deemed otherwise fitted for advancement. Candidates for admission to the school are selected by the conservators from among those of their head-guards and guards who are thought to possess the needful qualifications and to be capable of passing the required educational tests; ordinarily, they must have completed four years' service in the forests and be under thirty-five years of age, but passed students of the primary school can be admitted after two years' service in the forests. They are subjected to an entrance examination in the following subjects, viz.: Dictation, elementary geometry, French history, French geography, timber measurement, the selection and marking of trees to be felled or reserved, and the duties of forest subordinates generally.

The director of the school is a conservator of forests, who receives the pay of his grade and free quarters; he is aided, in the administration and teaching, by two assistant inspectors, each of whom receives an allowance of £40 a year in addition to his pay. Teachers who are not forest officers can be employed when their services are required. As is the case at Nancy, the director and the professors form a council of instruction and discipline. The students all hold the rank and wear the uniform of a head-guard. They are lodged at the school, and receive an allowance of £2 a month to provide themselves with food and clothing.

The instruction, which extends over two years, is both general and special or technical; the object being to improve the general education of the students, and also to give them such a professional training, theoretical and practical, as may fit them for the position they are to occupy. The course is arranged as follows, viz.:

First year.—Sylviculture, the cutting up and export of wood, estimates of quantity and value of timber, sales of forest produce, arithmetic and geometry, the elements of algebra and trigonometry, surveying and map-drawing, levelling, forest law, the elements of forest botany (including vegetable anatomy and physiology and the classification of the principal forest trees), planting and sowing, and geography.

Second year.—Working plans, buildings and roads, the elements of mineralogy, geology, and zoology, the treatment of torrents and dunes, forest law and administration, the elements of inorganic chemistry, agriculture and agricultural chemistry, literature and the geography of France. Most of the above subjects are taught not only in the class-room, but also practically

in the forest. The school is established on a property purchased before 1873 for the primary school from M. Vilmorin, who had raised on it a large number of exotic trees of many kinds. There is also on the estate a small forest treated as coppice under standards, which, with the state forest of Montargis, situated at a short distance from the school, is used for the practical instruction of the students. The buildings comprise the residence of the director, the class-rooms and students' quarters, as well as a museum, containing collections to illustrate the various courses of study.

The examinations are conducted before the director of the forest department, or an inspector general deputed by him for this duty, and the students who pass will, under the new organization, be appointed to the superior staff as sub-assistant inspectors. Like the officers trained at Nancy, they will be employed for about a year in learning their duties under an inspector, after which they will become eligible for further promotion on their merits, as are the other officers of the department. Subordinates from the communal forests are permitted to pass into the superior grades of the government service through this school. Nine students entered it during 1884 and 1885, and are still under instruction; eight of them having previously passed through the primary school. One free student followed the courses for a short time in 1883.

The primary school is a branch of the establishment at Barres, the instruction being given by the director and professors of the secondary school. It was established in 1878 for the training of young men who desired to enter the service of government as forest guards, or that of private proprietors as guards or wood managers, there being no restriction as regards their parentage. Up to the year 1883, 148 students had passed through it into the government service, and eight of these have since entered the secondary school. But in 1884 the primary school was reorganized, and it is now reserved solely for the education of the sons of forest officers and subordinates, who may desire to enter the government service as forest guards, with a view, in most cases, of their ultimately gaining the ranks of the superior staff through the secondary school.

Candidates must be between twenty-four and twenty-seven years of age; they must have completed their military service and be of good character, with a sound constitution. They are obliged to pass an entrance examination in dictation, French composition, arithmetic, elementary geometry, and French history and geography. While at the school they are styled "Student Guards;" quarters are provided for them, and they receive from government a part of their uniform, and an allowance of £1, 16s. a month to provide themselves with food and clothes.

The course occupies eleven months and embraces the following subjects, viz.: Arithmetic, plane geometry, algebraical signs, surveying and levelling, the French language, French history and geography, the elements of silviculture, the elements of forest botany (including vegetable anatomy, physiology, and the classification of the principal forest trees), and the elements of forest law and administration. The instruction is given partly in the class-rooms and partly in the form of practical work done in the forests.

Passed students are, as vacancies occur, admitted to the government service as forest guards of the second class; and after two years passed in the forests in that capacity they are eligible for entrance into the secondary school. During 1884 and 1885, however, only three students entered the primary school, two of whom are still there and one has received his appointment.

Free students can be admitted with the sanction in each case of the director of the forest department, but as yet none have entered the school.

CHAPTER VI.

THE PRIVATE WOODS AND FORESTS OF FRANCE.

Those woods and forests which are neither state nor communal property belong principally to private proprietors, of whom the number is very great, but also partly to civil, religious, commercial and other societies. Their extent varies of course from year to year, according as clearances are made for cultivation, or planting work is undertaken. No very exact record of the area is available, but the latest figures show it to be 23,657 square miles, or about two-thirds of the total wooded surface of France. It is probable that at the present time the private woodlands are being somewhat added to, rather than reduced, for it is believed that the areas annually planted up or sown exceed in extent those which are cleared. The private forests are not entirely free from state control; while at the same time they are protected by the legislation almost in the same manner and to the same extent as are the state and communal forests. For instance, private owners, in common with the government and the communes, enjoy the power to free their forests from wood rights by making over a portion of the ground to the right-holders in lieu thereof. Grazing rights can only be exercised in those parts of them which are declared by the forest department to be out of danger from the entrance of cattle, and the number of animals can be limited with reference to the supply of grass, while no right can exist to graze sheep or goats in them. Owners have also the power to free their forests of all rights, except those of wood, by the payment of compensation; and, speaking generally, it may be said that they have the same protection against injury to their property by right-holders as is enjoyed by the state and the communes. The law also places them in the same position as regards the punishment of forest offenses, including trespass by persons carrying cutting tools, cattle trespass, and the lighting or carrying of fire in or near the forests, with a claim to damages for injury caused. Proprietors can obtain for their forest guards, if they have them regularly sworn in, the same powers for the protection of their property as are exercised by the state and the communal guards.

On the other hand private owners cannot cut down and clear their forests without notifying their intention to do so at least four months beforehand, and the forest department can, with certain exceptions, successfully oppose the clearance if the maintenance of the woods is desirable on any of the following grounds, viz. :

1. To protect mountain slopes.
2. To protect the soil from erosion, and to prevent encroachments by rivers, streams or torrents.
3. To preserve springs and water courses.
4. To protect coasts against erosion by the sea and the encroachments of moving sand.
5. For the defense of the national frontier.
6. For sanitary reasons.

The minister of agriculture decides whether the clearance may be made or not. Between the years of 1828 and 1884 sanction has been accorded to the clearing of 1,795 square miles of private woodlands, but there is no record showing what proportion of this area has actually been cleared; and it is known that sanction is sometimes obtained merely to give an enhanced value to the property by the removal of restrictions on it. It is worthy of remark, however, that while the average area of which the clearance was annually authorized during the whole period above mentioned amounted to 20,160 acres, the average during the last ten years was 5,404 acres, and during the last five years it was only 3,731 acres. These figures seem to show that woods are acquiring an increased value in France, and that they are cleared for cultivation to a less extent than formerly.

It has already been said that there is a special law relating to the forests of the Maures and Esterel, where fires are systematically lighted in order to get rid of the injurious undergrowth, and that under it private proprietors in those regions are only permitted to light forest

fires at certain seasons, while they are compelled to cut fire-lines round all woods which are not completely cleared of inflammable shrubs. The manner in which the laws relating to the consolidation of mountain slopes and the planting of the dunes affect private owners has also been briefly explained in a previous chapter.

What has already been said regarding the systems of culture generally adopted for the state and communal forests respectively will lead to the correct conclusion that those belonging to private owners are, as a rule, treated as simple coppice, or coppice under standards, private high-forest being usually composed of coniferous trees, and situated in mountainous regions. But many of the forests that have been planted in the plains of the Landes, Salogne and Champagne are stocked with coniferous species, which are frequently more suited to the local conditions, under which they yield a better revenue than could be derived from other kinds of trees. Notwithstanding that the private forests are, as a rule, more favorably situated than those owned by the state or by communes, the gross revenue per acre derived from them is considerably less; because the trees, being cut down at a young age, yield a large proportion of timber of a small size and firewood. On the other hand their capital value is less, and when they are properly managed they should give a higher rate of interest.

But, unfortunately, although there are exceptions to the general rule, and some of the private forests are maintained in an excellent condition, it cannot be said that, generally speaking, they are so; for while coppice, and particularly simple coppice, is exhausting to the soil, from the young age at which the crop is cut and removed, and, in consequence of the comparative frequency with which the ground is denuded, tends to its physical deterioration, working plans are rarely prepared, and there is consequently no guarantee that the cuttings are confined within proper limits. The fellings are, in fact, too frequently regulated according to the financial requirements of the owner, rather than by the considerations which ought to govern such operations; and hence it follows that the condition of the private forests is not always such as could be desired. This is found to be the case in all countries; but it is probably especially so in France, where the laws relating to the division of the land on the death of its owner, and the custom of the country tend constantly to diminish the number of large properties, and to leave in the hands of each proprietor an area of woodland too small to admit of its management on a regular system.

The produce derived from the private forests is, however, large in amount, and of very great value. Exact figures are not obtainable; but it is probable that the 26,657 square miles yield annually over twelve million loads (of 50 cubic feet) of wood, with about two hundred and seventy thousand tons of tanning bark, 2,250 tons of cork bark, and 30,000 tons of resin—worth, altogether, more than £6,000,000; while the isolated trees and vines yield another three and a half million loads of wood, valued at £1,000,000. The number of foresters and guards employed in these forests is, however, comparatively speaking, very limited; this being due, in a great measure, to the small size of the individual properties, which are consequently, in a very large number of cases, managed directly by their owners. There are no private institutions for the training of foresters and woodmen; and although the state forest schools are open to receive "free students," very little advantage is taken of this privilege. The Nancy school has only trained thirty such students since it was established in 1824, and the secondary and primary schools have only received one student between them. Neither the owners, nor their managers or guards, have then, as a rule, had any professional education, notwithstanding that the means of obtaining it is open to them; and it is not to be wondered at if grave mistakes in the management of their forests are of frequent occurrence. In some places they have the means of getting a certain amount of advice from the state forest officials, who are occasionally permitted to render assistance in this manner; but they frequently attempt to imitate what is being done in the state forests, without knowing the reasons for what they see; and they are thus led to commit serious mistakes, as, for example, when, in treating a forest which is to be permanently maintained as coppice under standards, they follow the pro-

cedure adopted in a neighboring state forest which is undergoing conversion into high-forest. In many cases, of course, the private woods are too distant from the state or communal forests to permit of their owners obtaining any advice or assistance from the officials of the forest department, and they are then thrown entirely on their own resources.

CHAPTER VII.

THE ALGERIAN FORESTS.

The colony of Algeria, which was conquered in 1828, is 162,000 square miles in extent, that is to say, it is about four-fifths of the size of France. It is bounded on the north by the Mediterranean Sea, on the east by Tunis, on the west by Morocco, and it extends southward into the Sahara down to the 30th degree of latitude. It is divided into three departments, viz., Oran on the west, Algiers in the center, and Constantine on the east. The population averages only about 21 per square mile, as compared with 181 in France.

The two chains of the Atlas Mountains, which attain a maximum height of about 7,500 feet, run, roughly speaking, parallel to the coast, but join toward the eastern limit of the territory, enclosing between them the region, about 54,000 square miles in extent, known as the "high plateau," the mean elevation of which ranges from about 2,300 to 3,300 feet. This tableland is rendered remarkable by the presence of numerous lakes, called *chottes*, most of them salt, formed by the torrents which descend from the ridges on both sides, and are in flood during the rainy season. The range of hills which bounds the plateau to the north, falls away in broken spurs, which are separated by numerous valleys, to the sea, forming the fertile and hilly cultivated Tell, about 70,000 square miles in extent, which is the only part of Algeria where colonies have been established. Here the vine is largely cultivated, and excellent crops of cereals are raised. The southern slopes of the inner range descend into the Sahara, forming a region of about 38,000 square miles in extent, under the sands of which the water courses formed in the hills disappear. The desert is marked by dunes similar to those of Gascony, but is interspersed with oases which follow the course of the underground streams.

The climate near the coast is much the same as that of Provence, but somewhat hotter. As, however, the ground rises toward the crest of the first range, the temperature becomes cooler, and near the summit the air is moist, while at some seasons clouds lie on the hills and snow falls. The north and northwest winds bring rain, chiefly in the autumn and winter, the annual rainfall in the Tell being about 16 inches. The plateau receives less rain, and the distribution of it is very unfavorable, while in the desert beyond, the fall does not amount to more than 4 inches a year. The plateau is subject to very sudden changes of temperature, the south winds being burning hot, while those from the north are fresh and even cold; there are sometimes night frosts, even in summer, the daily range of temperature being occasionally as much as 70° Fahrenheit.

The forests were formerly much more extensive than they are at present. Abuse of all kinds, following on the first advance of civilization, has led to the destruction of the greater part of them, those which remain being found on the upper slopes of the mountain chains, chiefly on the inner ranges, where the absence of roads and other means of export has hitherto rendered them almost inaccessible to wood merchants; while their distance from the cultivated part of the country has protected them from some, at any rate, of the evils that have overtaken the forests in other localities. Some of the principal causes that have brought about the disappearance of a large portion of the Algerian forests, are the following, viz., repeated fires, the ground being deprived of its natural covering of vegetable mould, and the ashes resulting from the burning being washed off the soil by the rain; the grazing of goats, sheep, and camels; the native practice of felling young poles, instead of using the saw to cut up larger trees, the wood being not only used to supply local requirements, but being converted into charcoal, which, together with the bark, is exported in very large quantities; the light cover

of the Aleppo pine, which occupies a great portion of the ground, and does not do much toward the improvement of the soil; the digging up of the roots of shrubs to obtain bark and firewood; and finally the clearing of the trees from land which is totally unsuited to cultivation. This last-named cause of the disappearance of the forests has led also to the result that in many places the grass has followed the trees, and the loss of pasture land has in consequence been most serious. It is said that since the year 1870 the department of Oran has suffered the loss of one-half of its pastoral resources, while the want of a sufficient supply of wood is also much felt. Forest fires work terrible destruction in this hot and dry climate, burning up the vegetable *débris*, which would otherwise protect the ground, injuring the larger trees, and destroying the young growth; but lately measures have been undertaken to lessen this evil. It is said that during the twelve years from 1861 to 1873, nearly 1,000 square miles of forest in the Tell were burnt, the damage done having been enormous. Fires are not of such frequent occurrence in the forests overlooking the plateau, where the chief causes of injury consist in overcutting the young trees, and in overgrazing, both of which practices date from time immemorial.

Generally speaking, it may be said that the existing forests clothe the higher portions of the two chains of hills; the ground below and between them being occupied by cultivation in the Tell, by pastures on the plateau, and by sand toward the desert. On the high portion of the Tell, the forests contain most of the trees which are indigenous in Province, including the cork oak, which is the principal tree over a very large area, chiefly in Constantine, and is of great value; and the evergreen oak (*quercus ilex*), which yields excellent tanning bark, and is very common at altitudes above 3,000 feet, chiefly in Oran; while the Aleppo pine covers vast area in all three departments. Among other trees which are also found in Provence may be mentioned the maritime pine, the ash, the elm, the poplar, and the wild olive. The Zéen oak (*Q. lusitanica*), which is not found in France, occupies a large extent of country, the most important forest of this species being that of Beni Sala, in Constantine. The Thuya (*callitris quadrivalvis*), a coniferous tree, of which the wood is extremely valuable for cabinet-making is also found. In localities where the forests have been destroyed, a more or less dense growth of evergreen shrubs of various families, nearly all of them characterized by thick, coriaceous leaves, has sprung up, and a palm (*chamarops humilis*) covers a large extent of waste land.

On the hills sloping down to the plateau from the north and south, the most important trees are the Zéen oak and the cedar, the largest forests of the latter being those on the Aures, and at Belesma in Constantine, with that of Teniel-el-Had, in Algiers. The cedar (*cedrus atlantica*) forests are usually found at altitudes above 5,000 feet, but they cannot at present be worked for want of roads. The Aleppo pine, the edible oak (*quercus ballota*), the elm, ash, and other trees are also found in this region. The growth of trees upon the plateau itself is extremely poor, being confined almost entirely to a species of *sisyphus* and a *pistacia*; but immense areas are covered with alpa grass (*stipa tenacissima*), which is largely used for the manufacture of textiles and paper.

The following is a statement of the forest areas which now remain in Algeria:

	Square miles.
Managed by the forest department—	
State forests.....	7,604
Communal forests.....	300
	7,904
Not managed by the forest department—	
Communal and private forests.....	1,211
Total.....	9,115

This amounts to a little more than $5\frac{1}{2}$ per cent. only of the total area of the country. The state forests, as well as those belonging to communes and private proprietors, are much cut up by patches of cultivated land; while about one-half of the area managed by the department is covered with scrub, and is not worthy of the name of forest. The demarcation of the state forests is making good progress, and in the department of Algiers it will probably be completed

within the next three or four years. The cork oak is the most important tree over an area of about 2,300 square miles, of which one-half is included in the state forests. Above 6,000 tons-weight of cork, valued at £287,700, were exported from Algeria in 1878; and 5,940 tons, valued at nearly £290,000, were exported in 1880, chiefly from private forests. The quantity will increase every year in proportion as the trees in the state forests are gradually prepared for yielding marketable cork by the removal of their rough, natural coating, which is almost valueless. The timber cut from the forests does not suffice for local requirements, about £120,000 worth of logs and scantlings being annually imported from Sweden and other northern countries. The preparation of the cork trees in the state forests has not long been commenced, and several years must elapse before they can yield any considerable revenue; hence the gross returns from these forests are at present very small, and are far exceeded by the expenditure on them. Thus, in 1884 the expenditure was over £96,000, while the revenue did not much exceed £25,000; the heavy charges being due principally to the treatment of the cork trees and to demarcation and survey. After a time, however, these forests will pay well; but the value they have in regulating the water-supply and in ameliorating the climate would, even if they had not this prospect before them in the near future, amply justify the expenditure which is now being incurred on them.

It is, of course, most desirable that such denuded areas as are unsuited for cultivation should be reafforested, and some attempts in this direction have been made; but the difficulties encountered are great, and the expense of such work is very heavy, while at the same time the closing of any portion of the scanty pastures is strongly opposed by the inhabitants. On the other hand, although the greater part of the water-courses, which are dry during the summer months, become flooded torrents during the rainy season, the results are not nearly so disastrous as those which occur in the Southern Alps; and taking all these circumstances into consideration, it has now been determined not to undertake the formation on a large scale of additional forests, but rather to devote all available funds to the improvement of those which exist. What has to be done in this direction is to protect them from fires and from over-grazing, especially by goats, sheep, and camels; to develop a system of roads and paths, and to build houses for the forest officers and guards; to stop the practice of felling poles and young trees, and, by the introduction of the use of the saw, to promote the utilization of large trees; to plant up blanks within the forest, and to expropriate and stock portions, at any rate, of the cultivated areas within forest limits; to purchase such of the private forests as in the public interest ought to be under state management; to regulate the grazing arrangements, improve the pastures, and develop the growth of alpha grass on the plateau; to introduce a larger proportion of species affording heavy shade, so as to improve the soil; and to encourage enterprise in the way of forest improvement among private proprietors. These measures will tend to improve the climate and to regulate the water supply; and when, some years hence, they have advanced towards completion, it will be possible to commence the formation of new forests. In the meantime, the cultivators of the Tell have already done something to counteract the evil effects of the irregularity of the water-courses by erecting dams, constructing tanks, small canals, and other such works; and they have also planted up considerable areas of marsh land with gum trees (chiefly *eucalyptus globulus*), which have succeeded well so far.

The law of 1881 provides that all laws and rules which obtain in France apply in Algeria, in so far as they are not contrary to local legislation; but the governor-general has been invested with special powers, in order to avoid constant reference to the central government at Paris. Among other local laws there is one, enacted in 1874, relative to forest fires, the principal provisions of which are as follows, viz.: (1) No one, not even private proprietors in their own forests, can, between July 1 and November 1, light or carry fire outside the houses, even for charcoal-burning or the manufacture of tar or resin, either in the interior of the forests or within two hundred yards of them. (2) Neither can any one, within the same period, light shrubs, grass, or other vegetation within two and one-half miles of a forest without special sanction. (3) The native population is compelled to aid in the protection of the forests; and any persons, European or native, who, when called upon to put out a fire, refuse to assist, are liable to penal-

ties. (4) Independently of the individual penalties incurred by the actual offenders or their accomplices, the tribes can be fined collectively, when forest fires are caused by them. (5) When such fires appear to have been lighted intentionally, they can be considered as resulting from acts of insurrection, and the lands of the offending tribe can be confiscated. (6) After a forest, or part of one, has been burnt, right-holders cannot graze their cattle in it for at least six years.

A new law was passed in December, 1885, the principal provisions of which are the following, viz.: (1) All classes of proprietors can free their forests from rights of all kinds by payment of compensation, either in the form of land or money; and when estimating the value of such rights, the resources of the right-holders, on their own property, can be taken into account. (2) Patches of cultivation, or other private lands, inclosed within the state or communal forests can be expropriated. (3) The proprietors of cork forests, which have not been entirely cleared of shrubs, can be forced to maintain fire-lines round them. (4) With certain exceptions, no private proprietor can cut down or bark his trees without sanction. (5) With some exceptions, all practices which are injurious to the forests are treated under the laws relating to clearances—that is to say, they can be forbidden on certain specified grounds. (6) The two last named provisions of the law apply not only to areas covered with trees, but also in some cases to those which grow only scrub. (7) Any land which in the public interest ought to be afforested can be expropriated. (8) During the period (November 1 to July 1) in which the lighting of fires within or near forests is not expressly forbidden by the law of 1874, standing shrubs and grass cannot be burnt anywhere without previous sanction being obtained.

The number of forest officers of the superior grades employed in Algeria is 67. The forests of each department form a conservatorship; but these and the subordinate charges are very much larger than similar charges in France. Their average size is as follows, viz.: Conservatorship, 2,635 square miles; division, 527 square miles; subdivision, 176 square miles; guard's beat, 38 square miles—that is to say, a guard's beat is two-thirds of the size of a French division, the other charges being in proportion.

These areas are too large, but the forests cannot afford a stronger staff at present. Until very lately the Algerian forest department was entirely local; but it was found that this arrangement tended to interfere with its efficiency by impairing the status of the officers, and it is now incorporated with the general forest service of France.

WORKS ON FORESTRY.

The following books on forestry and forestry legislation were transmitted by the consuls with the foregoing despatches, and have been deposited in the library of the Department of Agriculture:

AUSTRIA-HUNGARY.

JÄGER, JOH. PHIL. ERNST LUDWIG. Das Forstkulturwesen nach Theorie und Erfahrung. 8vo., pp. xv, 651. Marburg: 1874.

FRANCE.

DEMONTEZ, P. Traité Pratique du Reboisement et du Gazonnement des Montagnes. 8vo., pp. xxxi, 528. Paris: 1882.

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